JANUARY 8, 1951

STEEL

The Magazine of Metalworking

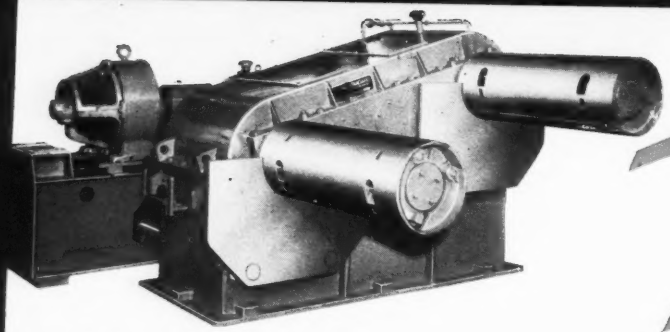
TITANIUM

How It Fits In Your Tomorrow

—page 54

Keep Up with Controls: A Checklist, p. 30

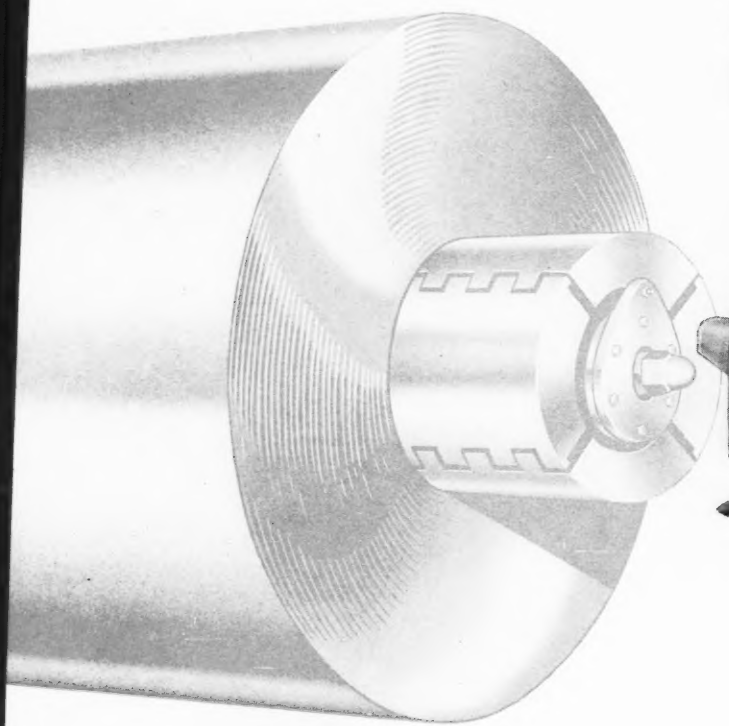
Buick Blasts Cleaning Costs, p. 60

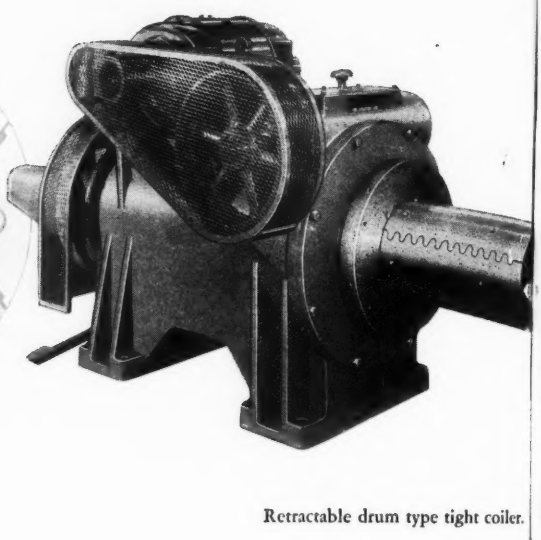


Double drum type tight coiler.

Tension Reels...

REELS FOR ANY SIZE COI



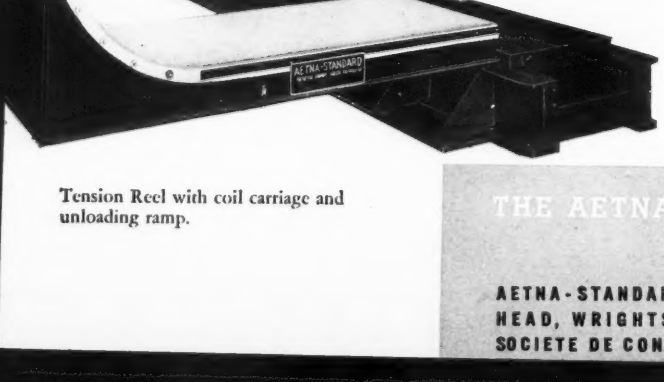


Retractable drum type tight coiler.

Coils in any commercial width or weight can be handled quickly and easily with Aetna Tension Reels. Rigid expansion is maintained without use of links.

With an Aetna-Standard reel you can have either hydraulic or mechanical lift and traverse; air or hydraulic operation for head expansion or stripper. Removable shoes permit handling of wide range of inside diameters. Reels furnished with or without unloading facilities.

Illustrated here are typical Aetna-Standard reels. Write Aetna-Standard for information for your specific requirements. Our flat-rolled specialists are available to you.



Tension Reel with coil carriage and unloading ramp.

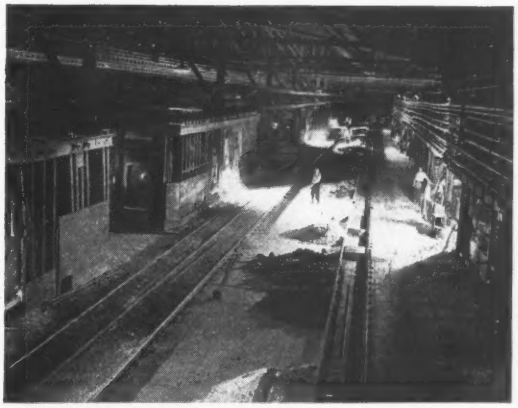
THE AETNA-STANDARD ENGINEERING COMPAN
YOUNGSTOWN, OHIO
ASSOCIATED COMPANIES
AETNA-STANDARD ENGINEERING CO., LTD., TORONTO, ONTARIO, CANA
HEAD, WRIGHTSON & COMPANY, LTD., THORNABY-ON-TEES, ENGLA
SOCIETE DE CONSTRUCTIONS DE MONTBARD, 6 RUE DARU, PARIS (8e)

COMPLETE STEEL SERVICE
for Industries of the West

3 STEELMAKING PLANTS

★ LOS ANGELES ★ SOUTH SAN FRANCISCO ★ SEATTLE

With its steelmaking plants located in Southern California, in the Bay Area, and in the Northwest, Bethlehem Pacific is equipped to provide Western industry with substantial tonnage of steel. Complete in every respect, these facilities include open-hearths, electric furnaces, various types of rolling mills, a wire mill, and metallurgical laboratories. Operations are all coordinated to produce the steel and to finish it into many products.



3 BOLT AND NUT PLANTS

★ LOS ANGELES ★ SOUTH SAN FRANCISCO ★ SEATTLE

Bethlehem Pacific operates bolt-and-nut manufacturing plants adjacent to its three steelmaking units. Each of these plants is equipped with automatic, high-speed machinery for producing a full line of bolts and nuts, as well as allied fasteners and specialties for different industries.

4 FABRICATING WORKS

★ LOS ANGELES ★ SOUTH SAN FRANCISCO
★ ALAMEDA ★ SEATTLE

Bethlehem Pacific's fabricating works are equipped to fabricate the steel for buildings, bridges, towers and miscellaneous structures of either small or large tonnage. Besides fabricating steel, this company also handles the erection of structural steel in any Western locality.

The plants mentioned here are some of the many specialized units within the Bethlehem Pacific organization. These facilities assure an economical, dependable source of materials for the builders, fabricators, manufacturers, railroads and miscellaneous steel-consuming industries in the eight Western states.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

GENERAL OFFICES: SAN FRANCISCO

BETHLEHEM PACIFIC

BETHLEHEM STEEL

Look at this difference in
MACHINING COSTS

SAE 52100 ball bearing raceway about 2" O.D., ¼" wall and ⅝" wide.

These startling figures were developed from actual cost records. The difference of 1.9¢ per part is the result of two important Rockrite advantages:

SMALLER MACHINING ALLOWANCE — That's because Rockrite Tubing is sized by a distinctively different process to *much closer tolerances* than are practical by any other method.

BETTER MACHINABILITY OF METAL — Because Rockrite Tubing is sized by cold-compression; has a denser, more uniform microstructure, better work surfaces — permitting higher cutting speeds and feeds. In this case machine output is some 60% higher.

The extra cost of Rockrite stock is only six-tenths of a cent per piece, and the costs shown above do not include savings in handling, coolant, rejects or magazine stocking.

Do you know the 3 requirements essential for tube accuracy and cost savings? New Bulletin R2 tells you . . . gives all the facts on close-tolerance Rockrite Tubing. Send for your copy today.

ROCKRITE TUBING

Leads all others in these savings

- **Higher cutting speeds**
- **Tools last longer between grinds**
- **Work-surface finishes are better**
- **Machined parts have closer tolerances**
- **Stations on automatics are often released for additional operations**
- **Extra-long pieces available—less downtime for magazine stocking and fewer scrap ends**
- **Closer tolerances often eliminate necessity for machining on outside or inside**

TR-116

TUBE REDUCING CORPORATION · WALLINGTON, NEW JERSEY

Make Containers Count

(and everything else, too)

with VEEDER-ROOT COUNTERS

Containers . . . coin machines . . . compressors . . . corn-husking machines . . . (or what have *you*?) . . . all these and scores more count to the greater advantage of their users or producers, or *both* . . . with Veeder-Root Counters. These infinitely useful devices, electrical or mechanical . . . may be either applied to a process or *built into a product* as original equipment. WRITE: Veeder-Root Inc., Hartford 2, Conn. (New Phone: 7-7201). *In Canada:* Veeder-Root of Canada, Ltd., 955 St. James St., Montreal 3. *In Great Britain:* Veeder-Root Ltd., Kilspindie Rd., Dundee, Scotland.

"VEEDER-ROOT COUNTS EVERYTHING ON EARTH"

FERRO MANGANESE FROM TENNESSEE

You can save freight costs by ordering mixed cars of Ferro Manganese, Ferro Silicon and briquettes. Specify standard grade lump, regular sized or briquettes in bulk or containers.

Test Tennessee's dependability—place an order for your next requirement of Ferro Manganese.

AGENTS:
Miller & Co., Chicago, St. Louis, Cincinnati
S. H. Bell Co., Pittsburgh
T. H. Benners & Co., Birmingham

EXPORT AGENT:
Ore & Ferro Corporation, 30 Broad St., New York

TENNESSEE PRODUCTS & CHEMICAL Corporation
NASHVILLE, TENNESSEE

STEEL

The Magazine of Metalworking

VOL. 128 NO. 2 **JANUARY 8, 1951**

THIS WEEK IN METALWORKING

NEWS

Letters to the Editors 12
The Metalworking Outlook 17
As the Editor Views the News 21
Checklist on Controls 30
Windows of Washington 32
Mirrors of Motordom 39
The Business Trend 43
Men of Industry 47

PRODUCTION-ENGINEERING

Production and Engineering News at a Glance 53
Titanium—How It Fits in Your Tomorrow 54
Seen and Heard in the Machinery Field 59
How Buick Cuts Forging Cleaning Costs 60
Molybdenum Plating—Answer to Lower Cost Metals for High Temperature Service? 62
Progress in Steelmaking—Nonferrous Strip Capacity Expanded 72
New Products and Equipment 85
Helpful Literature 89

MARKETS

Market Outlook 91
Metal Prices and Composites 92
Nonferrous Metals 98

Editorial and Business Staff—Page 10. Advertising Index—Page 114. Editorial index available semiannually. STEEL also is indexed by Engineering Index Inc., 29 West 39th St., New York 18.

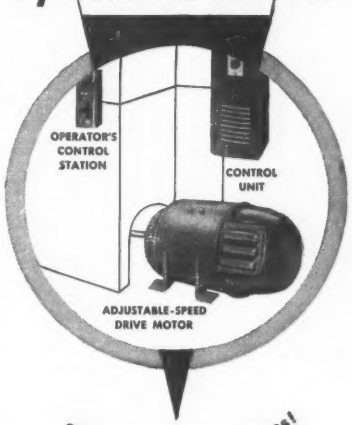
Next Week: **... A GUIDE FOR STEEL BUYERS ... Radioactive Tracers Detect Soil on Cleaned Surfaces ... Arc-Cast Molybdenum Probed for High-Temperature Utility**

Published every Monday by the Penton Publishing Company, Penton Building, Cleveland 13, Ohio. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Entered as second class matter at the postoffice at Clevelan, under the Act of March 3, 1879.

6 ADVANTAGES FOR YOU!

.. in this new, low-cost

Electric Transmission by RELIANCE®



STARTS without clutches!

STOPS without mechanical brakes or clutches!

REVERSES without use of gears or clutches!

SPEED ADJUSTMENTS without mechanical transmissions or change of gears!

JOGGING, INCHING, CREEPING without slipping clutches!

LOW COST—a price you can afford!

The new low-cost Reliance V★S Drive, in sizes from 3/4 to 3 hp., performs all the functions of mechanical transmissions—*electrically!* Simple, safe and economical in its operation from A-c. circuits ... here is the ideal drive for printing presses, paper winders and slitters, packaging machines, industrial food mixers, machine tools, conveyors and many other types of equipment. Write today for Bulletin D-2101.

RELIANCE V★S DRIVE®

Sales Representatives in Principal Cities

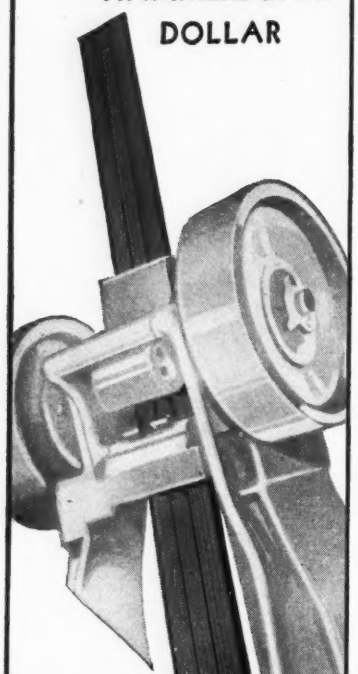
RELIANCE ELECTRIC AND ENGINEERING CO.

1081 Ivanhoe Road • Cleveland 10, Ohio

"Motor-Drive is More Than Power"

IRWIN

MORE FORGINGS
per
HAMMERBOARD
DOLLAR



•

GRADE "A"
HAMMERBOARDS
"WELDROCK"
[EDGE LAMINATED]
HAMMERBOARDS

•

RELEASE PINS
HELVES

Anything required in quantity from Pennsylvania's hard woods—maple and cherry

IRWIN
50 YEARS
of Quality

IRWIN
MANUFACTURING CO., INC.
GARLAND, PA.

Distributed by
JOHN H. SIPCHEN CO.
549 Washington Blvd., Chicago, Ill.
FRANK G. SHAUß
14456 Scripps Ave., Detroit, Mich.
BRETT'S PATENT LIFTER CO., LTD.
Foleshill Works • Coventry, England

Behind the Scenes . . .

Close Call

We went downstairs the other day to see Andy Anderson, production manager for STEEL, just after he had all the ads accounted for in the 454-page yearbook issue of Jan. 1. We expected to find him spent and exhausted but discovered him as fit as ever after putting together that book which was nearly a record in size. Our 1943 annual issue was a shade larger—460 pages all told.

"But I did have one close call this year," said Andy. "Bethlehem's plate did not arrive at the deadline; evidently it got sidetracked somewhere in the Christmas rush."

Andy called up the company, suggesting they substitute some other ad for the missing one. That was bandied about for a while, but Bethlehem President A. B. Homer said the original ad should go. So another plate was readied by Philadelphia electrotypers who sent it by their own man via plane to Cleveland. Andy met the fellow at the airport at 8:30 in the evening, then rushed it back to the Penton building where it was on the presses a short time later.

No wonder that Bethlehem wanted to run its original ad, for it told how the company's steel ingot capacity is now at 16 million tons, 1 million more than a year ago.

Cover Stories

Artist George Farnsworth did the titanium cover this week. He got his idea and did the initial artwork while snowbound in his home during the Great Storm late in November. The job, of course, ties in with Art Allen's comprehensive report on titanium which begins on page 54.

Next week's cover will refer to the guide for steel buyers, Associate Editor Vance Bell's opus that will be a comprehensive analysis of where and from whom you can buy what sizes and shapes in about 180 steel products. His job is keyed with STEEL's weekly pricing service. The two together will give you the most complete steel purchasing guide available in the U. S.

Far-Flung Correspondents

Our puzzle fans are all over the place. We received this note a while back from Mrs. Bartolomeu de Nagy of Lisbon, Portugal, in which she gave the correct answer to the Nov. 27 problem about how a family crosses a river.

"This is not the first time that I am able to give a correct answer to your most interesting puzzles, my husband being a subscriber to STEEL, as a matter of fact the only one in Portugal. I hope you are interested to receive my answers in time and that in the future you will do your best to shorten the arrival of your precious magazine."

Mrs. de Nagy is right about her puzzle answer but inaccurate about her husband being the only STEEL subscriber in Portugal. There are three others.

Puzzle Corner

Space was at a premium last week in the annual issue, so we had to dispense with the puzzle and answer to a previous one. The seven guests in the restaurant problem of Dec. 18 met in 420 days. First in with that answer were Robert, son of R. W. Huff of Republic Steel Corp.; Gustaf Polson of Judson L. Thomson Mfg. Co.; David M. Romsey Jr. of Republic Steel Corp.; C. E. Norton of Highland Park, Ill.; and P. C. Bertelson of Ford Motor Co.

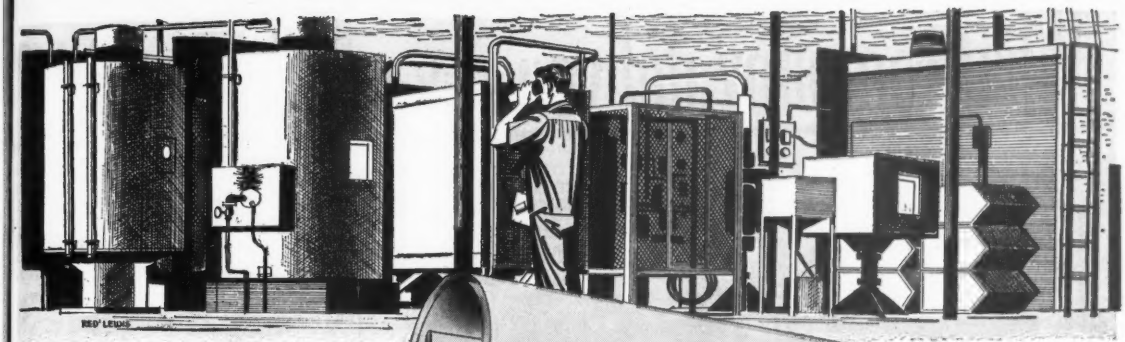
The fence in the Dec. 25 puzzle should enclose a rectangle one foot wide and nine feet long. Two more one-foot boards, one at each end, will double this area. T. S. Bean of Barber & Ross Co. and James S. Miller of Armco Steel Corp. came through on that one.

M. S. Bailey of Machine Products Corp. has an alternate answer whereby no additional boards would be needed to double the fence enclosure. Enclose a triangular area bounded by three sides, 9 x 9 x 2 feet. To double that, reconstruct the fence with existing boards to enclose a triangular area 6 x 6 x 8 feet.

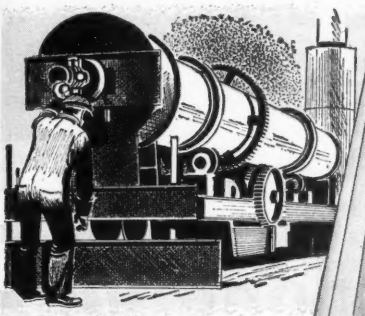
E. J. Sampson of Brockton, Mass., submits this one: 15 politicians and 15 statesmen are arranged in a circle on a ship. Every ninth person is sacrificed so that half the total number are lost. Arrange the order so that the politicians are lost and the statesmen are left.

Shrdlu

(Metalworking Outlook—page 17)



Laboratory furnaces used for high temperature investigation of refractories.



Rotary kiln producing experimental refractories in the laboratory.

Dilatometer used in tests to determine refractory strengths at high temperatures.

Frequent product analyses insure controlled quality.

An Unwritten Contract

5. A CONTINUING PROGRAM OF RESEARCH AND DEVELOPMENT.

Before you give your refractories business to a supplier you want to know—in addition to his ability for serving your present requirements—whether he is taking steps to provide for your future needs. Is he looking ahead—keeping his plants and products abreast of steelmaking demands? Is he showing constant improvement through research?

To earn a larger portion of the steel industry's hearth refractory business, this company maintains a well-staffed development laboratory. Basic Refractories set up the dead burned dolomite industry's first research laboratory in 1924—back in the days when calcined dolomite was standard for fettling and when a practical ramming mix like Ramset and air-emplaced refractories such as Gundol and Gunchrome were still unheard of.

Basic research goes beyond routine checking of product performance. Basic technicians employ extensive laboratory facilities to study the chemistry and mineralogy of various refractory compositions. They carry their investigation into the field to learn what happens to refractories in the furnace under attack by slag and metals. Their work is directed toward developing better refractories to better serve modern steelmaking practice.

Today's products, Magnefer, Syndolag, Basifrit, Ramset, Gundol and Gunchrome, created in the research laboratory, are being constantly improved. You can confidently expect that these refractories and other new and better ones will be ready to meet your needs tomorrow.

BASIC FURNACE REFRACTORIES

Basic Refractories Inc., 845 Hanna Building, Cleveland

"What company did you say you were with?"

HIKKENS, INC. MANUFACTURERS OF WIDGETS.
HAVEN'T HEARD OF YOU FELLOWS BEFORE, EVEN THOUGH WE USE A LOT OF WIDGETS.
WE'VE BEEN IN BUSINESS FOR ALMOST 35 YEARS AND OUR COMPANY HAS PIONEERED IN THE DESIGN AND DEVELOPMENT OF HIGH ALLOY WIDGETS. WE'RE EXCLUSIVELY WIDGET MANUFACTURERS WITH MODERN FACILITIES AND ENGINEERS WHO ARE TOPS IN THEIR BUSINESS. SOME OF YOUR MOST PROMINENT COMPETITORS ARE CUSTOMERS OF OURS.

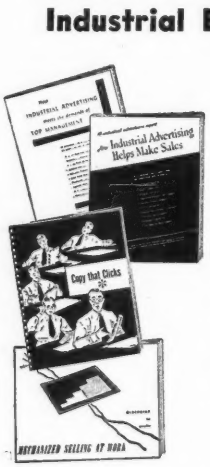
COMPANY IDENTIFICATION TAKES UP THE SALESMAN'S SELLING TIME

THE PROPOSAL IS WHERE PROFITABLE SELLING STARTS

Where does your sal

A sa
tiser
his c
work
maki
The
tive
time
sales
In
man

FREE—4 Useful Booklets for Industrial Executives



1. "How Industrial Advertising Meets the Demands of Top Management" and

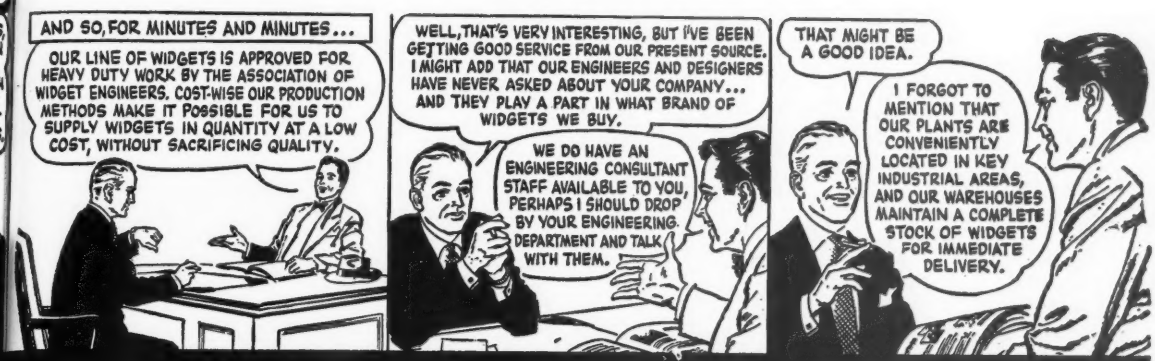
2. "How Industrial Advertising Helps Make Sales"—Each describes 10 performance-facts reports from the advertising-sales records of such companies as E. I. du Pont de Nemours & Co., General Electric Company, Hercules Powder Company, Westinghouse Electric Corporation, Koppers Co., Inc., Standard Conveyor Co. Each tells how a sales situation was analyzed—how advertising was used in these situations, and what results were obtained.

3. "Copy That Clicks"—This is not just about advertising copy. Contains 20 examples that will give you a new viewpoint on advertising objectives; will help your advertising people do a better job.

4. "Mechanized Selling at Work"—Prepared for executives who would like to apply the same concrete, mathematical principles of efficient product production to the improved efficiency of order production.

Write to National Industrial Advertisers Association, 1776 Broadway, New York 19 N. Y. for these useful booklets. They're free.

• *This message—one of a series by members of the National Industrial Advertisers Association—is published by* STEEL *to create a wider understanding of industrial advertising and the contribution it is making to American Industry. Reprints of this message are available in limited quantities. Address:* STEEL, *Readers Service Dept., Penton Building, Cleveland 13, Ohio.*


AND SO, FOR MINUTES AND MINUTES...
OUR LINE OF WIDGETS IS APPROVED FOR HEAVY DUTY WORK BY THE ASSOCIATION OF WIDGET ENGINEERS. COST-WISE OUR PRODUCTION METHODS MAKE IT POSSIBLE FOR US TO SUPPLY WIDGETS IN QUANTITY AT A LOW COST, WITHOUT SACRIFICING QUALITY.
WELL, THAT'S VERY INTERESTING, BUT I'VE BEEN GETTING GOOD SERVICE FROM OUR PRESENT SOURCE. I MIGHT ADD THAT OUR ENGINEERS AND DESIGNERS HAVE NEVER ASKED ABOUT YOUR COMPANY... AND THEY PLAY A PART IN WHAT BRAND OF WIDGETS WE BUY.
WE DO HAVE AN ENGINEERING CONSULTANT STAFF AVAILABLE TO YOU, PERHAPS I SHOULD DROP BY YOUR ENGINEERING DEPARTMENT AND TALK WITH THEM.
THAT MIGHT BE A GOOD IDEA.
I FORGOT TO MENTION THAT OUR PLANTS ARE CONVENIENTLY LOCATED IN KEY INDUSTRIAL AREAS, AND OUR WAREHOUSES MAINTAIN A COMPLETE STOCK OF WIDGETS FOR IMMEDIATE DELIVERY.

BUILDING UP COMPANY PRESTIGE TAKES UP THE SALESMAN'S SELLING TIME

...r salesman start to work?

A salesman for a consistent industrial advertiser never has to spend his time identifying his company or his products. He can start to work——where a salesman is paid to work: making a specific proposal; closing the sale. The time you save your salesman with effective industrial advertising gives him more time to make more calls . . . . . and more sales!

Industrial advertising makes your salesman's job easier, faster . . . . . and at a lower sales cost to you. Your sales program is incomplete without industrial advertising. Check into this modern sales tool! See how it can benefit you!

Here are some of the many things Industrial Advertisers can do:

1. Tell your company story the way you want it to be told.
2. Identify your product with your company . . . . to the men who specify or buy.
3. Explain your product adequately . . . . to the men who specify or buy.
4. Point out special features of your products or services.
5. Sell your salesmen on your company and products.

INDUSTRIAL ADVERTISING ASSOCIATION OF NEW YORK

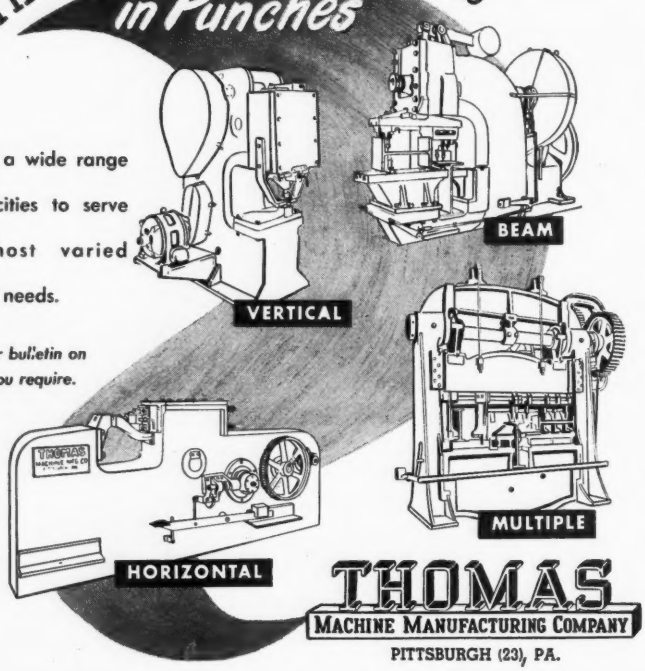
A CHAPTER OF THE NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION

A national organization, comprised of 3,500 members of the 34 local associations of industrial advertising and sales executives—dedicated to greater efficiency in industrial distribution—and lower sales cost.

THE TREND IS TO THOMAS *in Punches*

Made in a wide range of capacities to serve your most varied punching needs.

Send for bulletin on type you require.



THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH (23), PA.

24

PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

"New Process"
Punches • Dies • Rivet Sets
Compression Riveter Dies
Made from high-grade alloy tool steels properly heat-treated, of uniform high quality—may be purchased with complete confidence for maximum service.
Write for Catalog 46
GEO. F. MARCHANT COMPANY
1420-34 So. ROCKWELL ST., CHICAGO 8, ILL.

STEEL

EDITORIAL STAFF

Editor-in-Chief.....E. L. SHANER
Editor.....IRWIN H. SUCH
Managing Editor.....WALTER J. CAMPBELL
Market Editor.....WM. M. ROONEY
Engineering Editor.....WALTER TOERGE
Steel Plant Editor.....J. D. KNOX
Machine Tool Editor.....GUY HUBBARD
Consulting Editor.....ALLEN G. GRAY
Art Editor.....DON S. CADOT

Associate Editors:

A. H. ALLEN
VANCE BELL, FRANK R. BRIGGS
DAN REEBEL, JOHN S. MORGAN

Assistant Editors:

HENRY J. HOLTZ, DOLORES K. MAILLE
EDWIN L. KARPICK, L. J. SKUDERIN
EDWARD C. BIRKNER, M. T. BORGERHOFF

Resident Editors:

Washington.....E. C. KREUTZBERG
New York.....B. K. PRICE, L. E. BROWNE
Pittsburgh.....J. C. SULLIVAN
Detroit.....H. C. TUTTLE
Chicago.....E. F. ROSS
London, European Editor, VINCENT DELPORT

Editorial Correspondents:

Birmingham.....R. W. KINCEY
Buffalo.....L. C. FELDMANN
Cincinnati.....SAMUEL S. CARR
St. Louis.....MAC L. HUTCHENS
Youngstown.....GEORGE R. REISS
Los Angeles.....NORMAN LYNN
San Francisco.....EDWARD HAVERTY
Seattle.....R. C. HILL
Dallas.....C. K. CATES
Toronto.....F. S. TOBIN
Birmingham, Eng.....J. A. HORTON
Paris, France.....LEON JAUDOIN
Liege, Belgium.....JACQUES FOULON
Dusseldorf, Germany.....HERBERT GROSS

BUSINESS STAFF

Business Manager.....J. W. ZUBER

Advertising:

Service Manager.....C. H. BAILEY
Production Manager.....A. V. ANDERSON
New York.....E. W. KREUTZBERG
K. A. ZOLLNER, CALVIN FISHER, JR.
Pittsburgh.....S. H. JASPER, B. C. SNELL
Chicago.....L. C. PELOTT
W. L. POLAND
Cleveland...D. C. KIEFER, H. G. ROWLAND
Los Angeles.....F. J. FULLER

Circulation Department:

Manager.....G. R. EBERSOLE
Readers Service.....E. L. FRANKE

Circulation Representatives:

H. R. DUNNE, D. G. HEWITT, C. A. PRICE

Main Office:
Penton Building, Cleveland 13, Ohio
Main 1-8260

Branch Offices:

New York 17.....60 East 42nd St.
Murray Hill 2-2581
Chicago 11.....520 North Michigan Ave.
Whitehall 4-1234
Pittsburgh 19.....2837 Koppers Bldg.
Atlantic 1-3211
Detroit 2.....6560 Cass Ave.
Trinity 5-3024
Washington 4..1123 National Press Bldg.
Executive 6849
Los Angeles 4..130 N. New Hampshire Ave.
Dunkirk 2-1758
London, 2 Caxton St., Westminster, S.W. 1

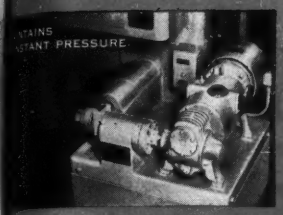
Published by

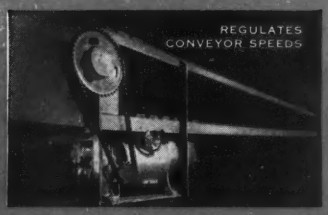
THE PENTON PUBLISHING COMPANY

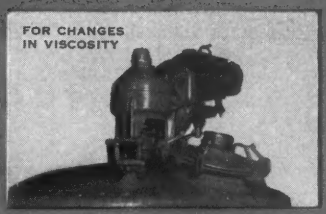
Chairman.....E. L. SHANER
President and Treasurer.....G. O. HAYS
Vice Pres., Director of Adv. R. C. JAENKE
Vice Pres. and Secretary F. G. STEINEBACH
Assistant Treasurer.....R. W. COLEMAN

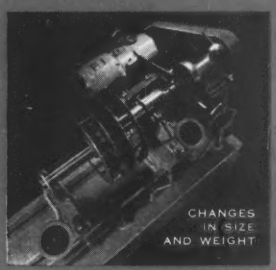
Also publisher of
THE FOUNDRY • MACHINE DESIGN
NEW EQUIPMENT DIGEST

Member, Controlled Circulation Audit, Inc., National Publishers' Association and Society of Business Magazine Editors.









again and again
variable speed operation
makes a good job better

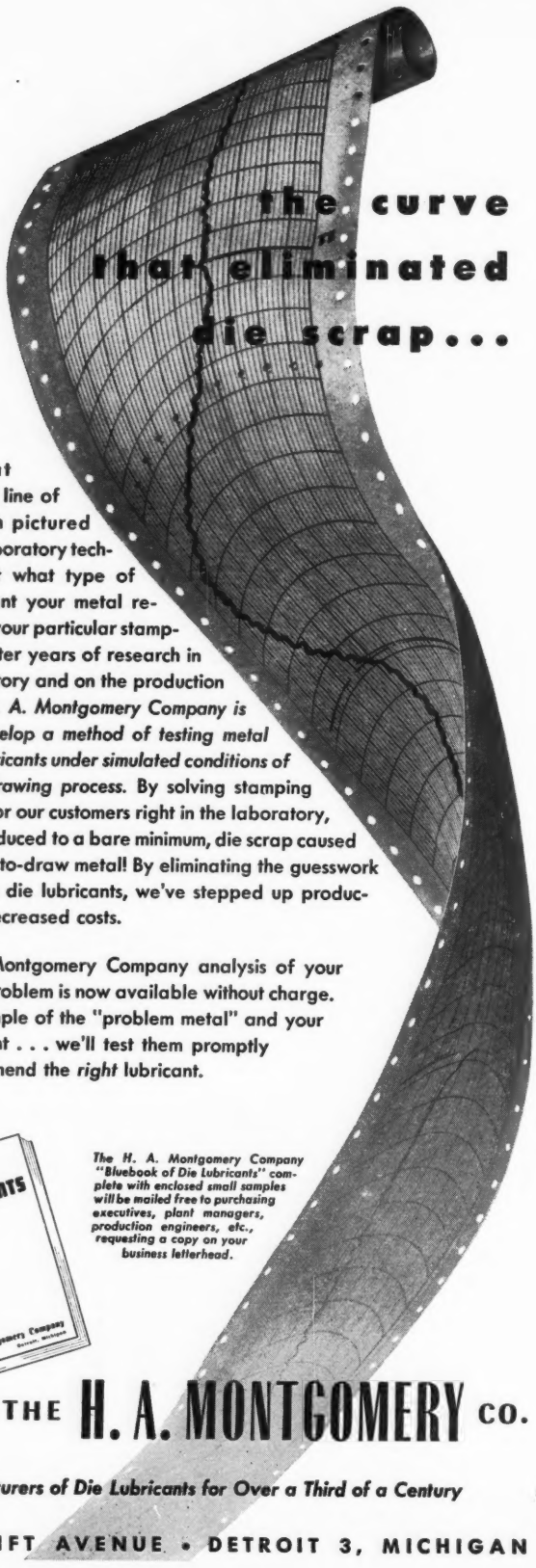
Better because variable speed operation pays off in higher rates of production, a more uniform better quality product and more efficient performance of your equipment and your operators.

Make the job better still by using Master Speedrangers because their all-metal construction makes them extremely compact and durable . . . more flexible and adaptable to a wide range of uses. They're available in sizes up to 5 horsepower with speed ranges up to 12 to 1 in most sizes.

Write for descriptive booklet Data 7525 and see how Master Speedrangers can help you get better results on material processing, handling and conveying equipment . . . mixers and agitators . . . machine tool drives . . . testing and calibrating equipment and many other applications.

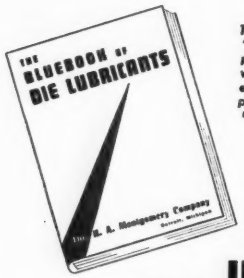
THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

MASTER SPEEDRANGERS



Yes, that curving line of the graph pictured tells our laboratory technicians just what type of die lubricant your metal requires for your particular stamping job! After years of research in the laboratory and on the production line, *The H. A. Montgomery Company is first to develop a method of testing metal and die lubricants under simulated conditions of the deep-drawing process.* By solving stamping problems for our customers right in the laboratory, we have reduced to a bare minimum, die scrap caused by difficult-to-draw metal! By eliminating the guesswork in selecting die lubricants, we've stepped up production and decreased costs.

An H. A. Montgomery Company analysis of your stamping problem is now available without charge. Send a sample of the "problem metal" and your die lubricant . . . we'll test them promptly and recommend the *right* lubricant.



The H. A. Montgomery Company "Bluebook of Die Lubricants" complete with enclosed small samples will be mailed free to purchasing executives, plant managers, production engineers, etc., requesting a copy on your business letterhead.

THE **H. A. MONTGOMERY** CO.

Manufacturers of Die Lubricants for Over a Third of a Century

17191 SWIFT AVENUE • DETROIT 3, MICHIGAN

LETTERS
TO THE EDITORS

Stainless Developments

It is noted on page 94 of STEEL, Dec. 4, 1950, that you refer to certain developments in stainless steel manufacturing, reported by the British Iron and Steel Research Association. It would be appreciated if you would let me have the source of the data used for this article.

H. P. Rassbach,
Metallurgical Engineer-Development, Electro Metallurgical Div., Union Carbide & Carbon Corp., New York, N. Y.

• *Information in the article came from release No. 506, published by British Iron and Steel Research Association, 11 Park Lane, London, W. 1, England.*

Half Off on Steel Mills

As you doubtless know, the federal government of Canada in 1948 offered to contribute 50 per cent toward the cost of a new steel plant for Canada with no success. Steel shortage in Canada until the recent war scare was 1 million tons per year; now it is about 4 million tons. Could you let me know who might be interested in building such a plant in Canada?

Could you also send me copies of the issues of STEEL reporting the steel plant in Brazil, specifically the issue dealing with the proposed project and later issues outlining the completed job?

Lloyd Jaeger
Allandale, Fla.

• *Issues containing information on the Volta Redonda steel plant in Brazil are as follows: Sept. 18, 1944, p. 77; Aug. 27, 1945, p.79; Oct. 22, 1945, p. 104; Apr. 1, 1946, p. 129; Aug. 5, 1946, p. 105; Mar. 31, 1947, p.57; Jan. 16, 1950, p. 33; Oct. 23, 1950.*

An Old Model Crops Up

On page 106 of the Nov. 20, 1950, issue of STEEL, reference is made to a new slide-set vise. You may be interested to know that I have as an inheritance a vise functioning essentially as does the new one described. On the sides of the cast frame in the usual foundry raised letters, as nearly as I can diagnose same, is the following:

H. F. Read Patents
1852
Read Gleason & Read
Mfrs.
Brooklyn, N. Y.

Charles B. Irmer
Roslyn, Pa.

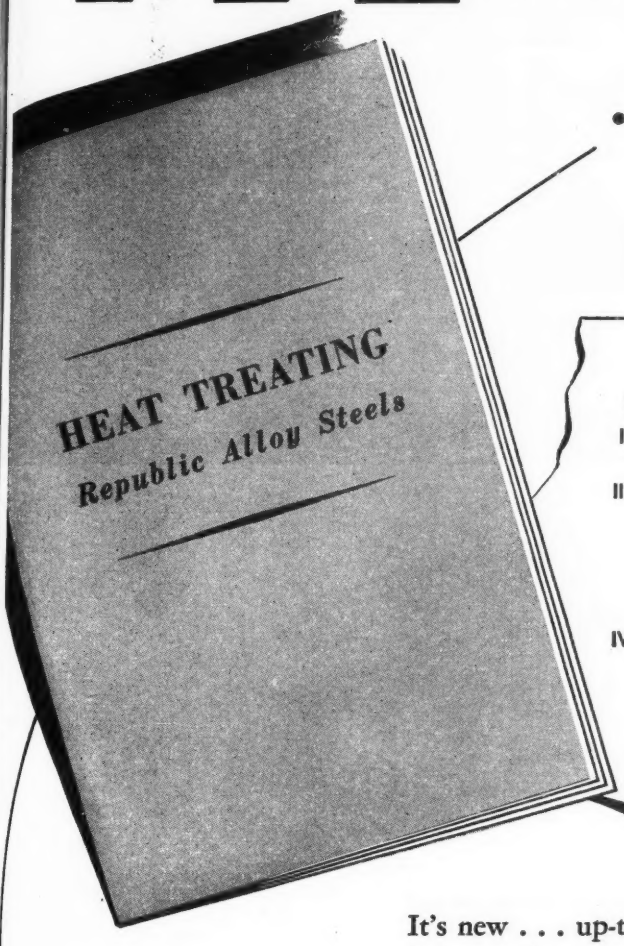
New Coat

STEEL for Apr. 17, 1950, carried an article which referred to a coating preparation I want to eliminate handpolishing after forming of small tubular parts, and I believe it could be accomplished by using the material referred to in your article. Where can I get additional information?

Albert Vuilleumier
West Goshen, Conn.

• *The coating preparation is available from Northwest Chemical Co., 9310 Roselawn Ave., Detroit, and H. A. Montgomery Co., 17191 Swift St., Detroit.*

If you use Alloy Steels...



...you should have this NEW helpful booklet!

TABLE OF CONTENTS

I Heat Treatment of Steels

II Transformation of Austenite Shown Graphically (Isothermal Transformation Diagrams)

III Heat Treating Methods

Annealing	Nitriding
Hardening	Cyaniding
Martempering	Flame Hardening
Carburizing	Induction Hardening

IV Mechanical Properties of Alloy Steels

DATA & REFERENCE CHARTS

Critical Points	Carburizing Depths
Ms Calculation	Nitriding Depths

Mechanical Properties

It's new . . . up-to-the-minute . . . 54 pages of valuable heat treating data that belongs on the desk of every alloy steel user.

Republic—world's largest producer of alloy and stainless steels—offers you this useful booklet without cost or obligation in any way.

Just fill in the coupon and mail *today.*

REPUBLIC STEEL ®

REPUBLIC STEEL CORPORATION
Advertising Division
3120 East 45th Street, Cleveland 27, Ohio

Please send me a copy of your new booklet *Heat Treating Republic Alloy Steels.*

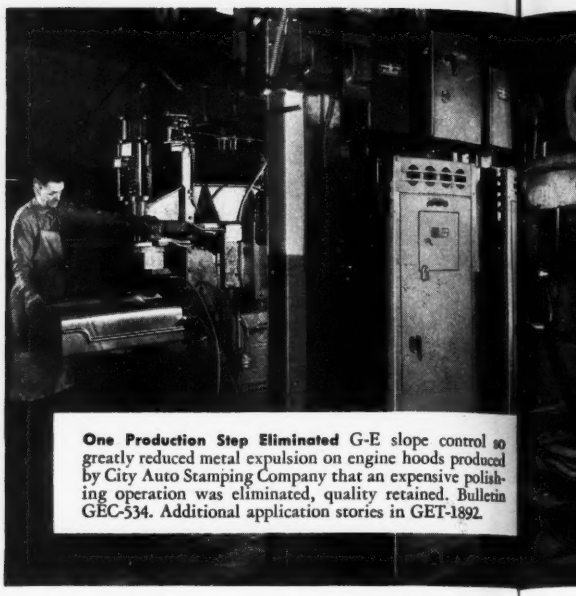
Name ..... *Title* .....

Firm .....

Address .....

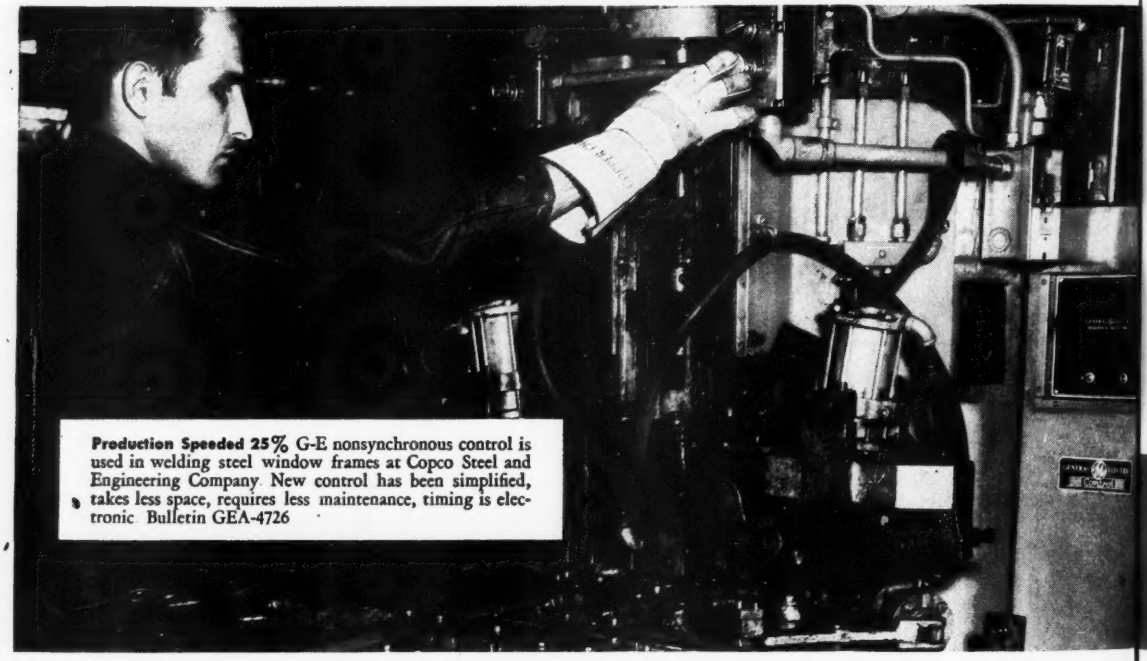
City ..... *State* .....

New Alloy Welded—just .007 inch thick G-E Thyratron spot-welding control is used at the Elgin National Watch Company on a Dura Power mainspring. Elgin reports, "Thanks to G-E control, work is easy, accurate, and production is high." Bulletin GEA-4175A.

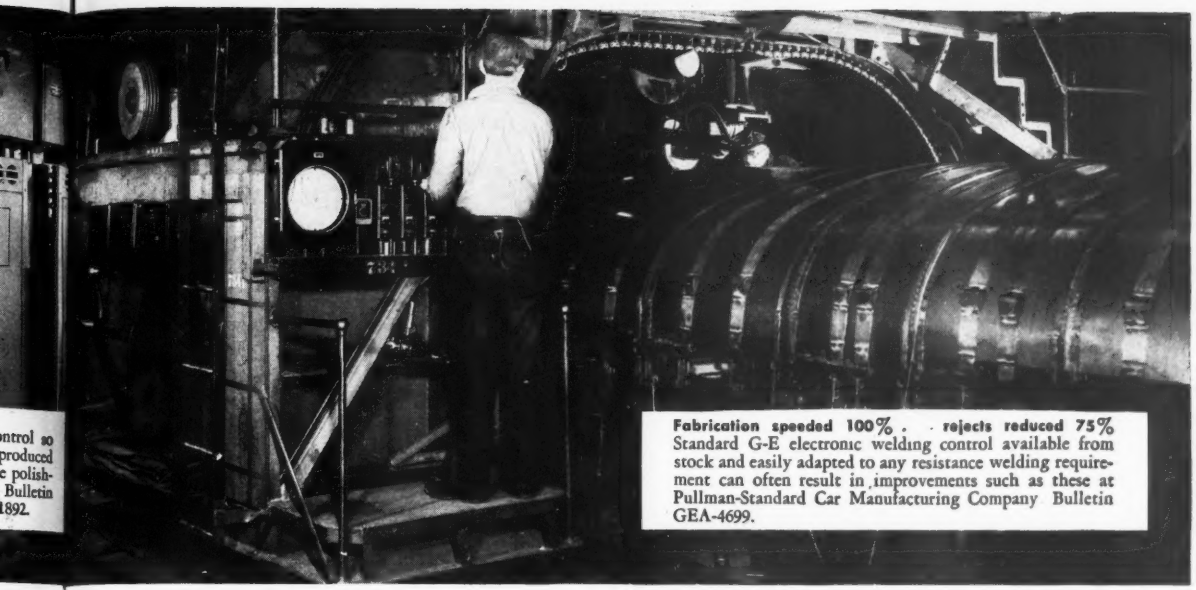


One Production Step Eliminated G-E slope control so greatly reduced metal expulsion on engine hoods produced by City Auto Stamping Company that an expensive polishing operation was eliminated, quality retained. Bulletin GEC-534. Additional application stories in GET-1892.

LOOK!



Production Speeded 25% G-E nonsynchronous control is used in welding steel window frames at Copco Steel and Engineering Company. New control has been simplified, takes less space, requires less maintenance, timing is electronic. Bulletin GEA-4726



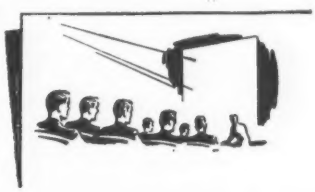
Fabrication speeded 100% . . rejects reduced 75% Standard G-E electronic welding control available from stock and easily adapted to any resistance welding requirement can often result in improvements such as these at Pullman-Standard Car Manufacturing Company Bulletin GEA-4699.

4 more companies improve production

WITH G-E ELECTRONIC RESISTANCE WELDING CONTROLS

Weld faster, cleaner, and with less kva demand. Weld new alloys. There are G-E electronic controls to help *you* improve production, improve *your* product, reduce costs just as they have done in the cases described here. Take advantage of the newest improvements and developments in G-E control—the wide experience of our welding control specialists. Together with your welding machine manufacturer, they'll help you solve production problems. Write your nearest G-E office today for more information. *General Electric Company, Apparatus Department, Schenectady, New York.*

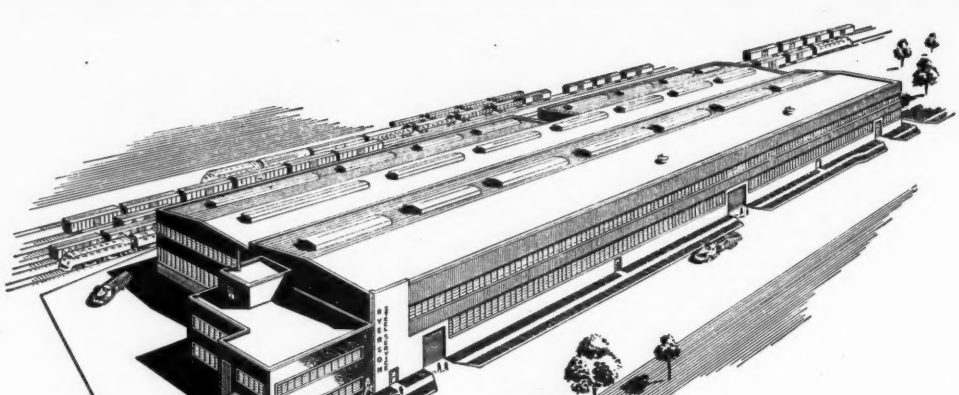
REMEMBER . . . GOOD resistance welding depends on GOOD electronic control. When you buy insist on G.E. . . . longest in the business with the most complete line of resistance welding controls. For quick and easy training of operators ask your welder manufacturer, power supplier, or the nearest G-E office for a FREE showing of the sound, all-color movie, "This is Resistance Welding," a General Electric More Power to America film.



You can put your confidence in—

GENERAL ELECTRIC

645-53



Announcing a New

Ryerson Steel Plant for the Cincinnati Area

Typical of the many new projects in our coast-to-coast expansion program is this big, new plant recently opened in Cincinnati. Here, in a new location, after twenty-seven years in our former Cincinnati plant, we continue to serve this vital industrial area.

This new unit is part of our nation-wide steel-service organization, now more than a century old. Like all Ryerson plants, it is strongly staffed with experienced steel men. Facilities include the most modern cutting and handling equipment and the plant is scientifically laid out for accurate processing and shipping.

As you know, great demand now makes it impossible for us to take care of all requirements—much as we would like to. But we are planning and building for better steel service in the future. Meanwhile, we'll do our level best to help you whenever you call your nearby Ryerson plant.

PARTIAL LIST OF PRODUCTS—BARS • STRUCTURALS • PLATES SHEETS • TUBING—IN CARBON, ALLOY & STAINLESS STEEL

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

The Metalworking Outlook

Full Mobilization—Soon a Reality

Full-scale industrial mobilization will be a reality by next fall. Wage, price and distribution controls will be coming fast for the next three months; then, a levelling off as industry tries to get used to new traces. You'll begin to notice civilian production cutbacks by March. Mobilization Boss C. E. Wilson is getting his feet on the ground. Indication: Shakeup in the defense setup with W. H. Harrison as new Defense Production Administrator. You'll probably continue to do business with your old contacts at NPA and in Interior. Watch for simplification of NPA's confusing orders and regulations.

Price Formula Shaping Up

A price control formula will be worked out by March that probably will permit some increase within the control framework. Wage Stabilizer Cyrus H. Ching is calling industry-labor meetings Jan. 10-12. Price limitations on autos are generating behind-the-scenes bickering in the industry. Some suppliers have raised quotations, say they aren't affected. Rollbacks to Dec. 1 in other industries have been made, by Allis-Chalmers, International Nickel and others.

Manpower: Tighter and Tighter

Manpower in the coming year will be as tight or tighter than at any time during World War II. Employment hit an alltime high of 62.4 million in August when there was relatively little defense output; that record will have to be shattered in 1951 if we're to produce both defense and civilian goods. Labor Department is establishing a system of regional and area Management-Labor Committees on Defense Manpower. In coming months, the "electric brains" developed at M.I.T. and elsewhere will become more than a scientific curiosity. They'll be used to save labor. Already designed is an electric brain lathe, controlled by electric tape, which will automatically turn out a finished product.

Materials Shortages: Worse and Worse

Materials shortages will get much worse in 1951. Already, steel needs for direct defense have been hiked from 1.5 million to 2 million tons (p. 31) for the first half. Bad weather has cut ferrous scrap collections so badly that some kind of pooling arrangement will have to be worked out. That has affected scrap prices which will shortly be controlled. Aluminum is one of the tightest nonferrous metals. Watch for an NPA order to conserve the material by prohibiting the mixing of various types of aluminum scrap.

Troubles in Transport

A transportation shortage will hit you in 1951. The nation's need for new freight cars will not be met despite capacity pro-

Production-Engineering News—p. 53 *Market Outlook—p. 91*

duction in the next 12 months. We need 20,000 new cars per month, hopelessly above the present 10,000-per-month capacity. Even so, railroads have greater carrying capacity than at the time of Pearl Harbor. That means more truck and water transportation. The 168,000 employed in American shipyards will be increased in coming months. Truck and trailer output will not be curtailed.

Conveyor Belts and Dirigibles

The transport scarcity will boom plans for long-distance conveyor belts and airlift dirigibles in 1951. Railroad lobbies will have a more difficult time this year blocking the belt conveyor from Lorain to East Liverpool, O. Goodyear is again plumping for big Zeppelin type airships to supplement America's airlift as large-capacity, relatively high-speed cargo carriers.

Rush To Get Into Aviation

Automakers are rushing to get in on part of the aviation program as the outlook darkens for high auto production. GM, Kaiser-Frazer and Ford already are in on various phases. Studebaker wants to build engines, is dickering for a contract.

A Lift from Titanium

Titanium may help you in 1951. Its strength and corrosion resistance means that it has a great future in metalworking. Technical developments may soon surmount the problems of its high cost and short supply. The military now gets nearly the entire production, about 2000 pounds a day (p. 54).

South American Steel

South America may become an important source of steel for the U.S. Virtually all imports now come from Europe. Pig iron is already arriving from Chile's new mill near Concepcion. The mill can produce 236,000 tons of ingots a year; with a relatively small additional investment, it can boost that to 350,000 tons yearly. Columbia will build a mill at Paz del Rio.

What Industry Is Doing

Programs underway or projected will boost ingot capacity to 113 million tons, not 110 million as first estimated; most of the projects will be completed by the end of 1952 (p. 25) .. . . . U. S. Steel is installing thawing devices to ship 2 million tons of iron ore by rail to its plants this winter in an unparalleled operation (p. 27) . . .. Defense bought more than $9.2 billion worth of major items from July through November, 1950 (p. 28) . . . NPA orders increase (pp. 30-31) . .. .. Government economists are more alarmed than they admit publicly at the rising inflation (p. 43) . . .. U. S. Steel's Consolidated Western Steel Corp. is induction welding 36-inch pipe . . . The report on the Celler Committee's study of monopoly power relative to the steel industry—hearings were held early last year—contains neither recommendations nor conclusions.

WASHBURN

WASHBURN WIRE COMPANY, NEW YORK CITY
CLEAN, UNIFORM BILLETS–STRIP–RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

Counsel Offered

ON METAL PROBLEMS

Because of unusually heavy industrial and defense demand, rationing of nickel has been in force since July 1st. However, we believe that dissemination of technical data and service experience can help to promote the intelligent utilization of critical materials, so essential in these times. We shall, therefore, continue to issue information on new developments and user experience with nickel-containing materials.

"INCO" TECHNICAL SECTIONS

Consultation on technical problems relating to alloys containing nickel is invited. Consult the nearest Technical Field Section of INCO Development and Research Division listed below:

CANADIAN SECTION
25 King Street, West,
Toronto 1, Ont.
Tel. Elgin 7471

CENTRAL ATLANTIC COAST SECTION
67 Wall Street,
New York 5, N. Y.
Tel. Whitehall 4-1000

CHICAGO SECTION
333 N. Michigan Avenue,
Chicago 1, Ill.
Tel. Franklin 2-4030

CINCINNATI SECTION
Carew Tower,
Cincinnati 2, Ohio
Tel. Parkway 1631

DETROIT SECTION
General Motors Building
Detroit 2, Mich.
Tel. Trinity 5-3436

EMPIRE STATE SECTION
Genesee Valley Trust Bldg.,
Rochester 14, N. Y.
Tel. Locust 5834

NEW ENGLAND SECTION
75 Pearl Street
Hartford 3, Conn.
Tel. Hartford 7-0383

PITTSBURGH SECTION
Grant Building
Pittsburgh 19, Pa.
Tel. Atlantic 1-9546

ST. LOUIS SECTION
Ambassador Bldg.,
St. Louis 1, Mo.
Tel. Garfield 4197

TEXAS SECTION
Commerce Bldg.,
Houston 2, Texas
Tel. Charter 4234

TWIN CITIES SECTION
Northwestern Bank Bldg.,
Minneapolis 2, Minn.
Tel. Geneva 0631

WEST COAST SECTION
Petroleum Bldg.,
Los Angeles 15, Calif.
Tel. Prospect 2496

STOCK AND SERVICE CENTERS FOR "INCO" PRODUCTS

The following are sources of supply for primary nickel for alloying purposes. Through casting specialists, they are prepared to offer technical service on the production of ferrous and non-ferrous castings containing nickel.

ATLANTA 3
J. M. Tull Metal & Supply Co.
285 Marietta Street
Tel. Walnut 3525

BALTIMORE 17
Whitehead Metal Products Company, Inc.
413 West North Avenue
Tel. Lafayette 2300

BUFFALO 2
Whitehead Metal Products Company, Inc.
254 Court Street
Tel. Cleveland 1475

CAMBRIDGE 39, MASS.
Whitehead Metal Products Company, Inc.
281 Albany Street
Tel. Trowbridge 6-4680

CHICAGO 23
Steel Sales Corporation
3348 South Pulaski Road
Tel. Bishop 7-7700

CINCINNATI 29
Williams and Company, Inc.
3231 Fredonia Avenue
Tel. Capitol 3000

CLEVELAND 14
Williams and Company, Inc.
3700 Perkins Avenue
Tel. Utah 1-5000

COLUMBUS 8, OHIO
Williams and Company, Inc.
851 Williams Avenue
Tel. Klondike 1623

DALLAS 9
Metal Goods Corporation
6211 Cedar Springs Road
Tel. Elmhurst 3271

DENVER 5
Metal Goods Corporation
Municipal Service Center
37th at York
Tel. Acoma 5891

DETROIT 10
Steel Sales Corporation
5151 Wesson Avenue
Tel. Tyler 6-3000

EDMONTON, ALBERTA
Wilkinson Company, Ltd.
8411 103rd Street
Tel. 35834

HARRISON, N. J.
Whitehead Metal Products Company, Inc.
1000 South 4th Street
Tel. Humboldt 5-5900

HOUSTON 3
Metal Goods Corporation
711 Milby Street
Tel. Central 8881

INDIANAPOLIS 2
Steel Sales Corporation
1916 North Meridian Street
Tel. Talbot 1506

KANSAS CITY 8, MO.
Steel Sales Corporation
2201 Grand Avenue
Tel. Victor 7270

LOS ANGELES 21
Pacific Metals Company, Ltd.
1400 South Alameda Street
Tel. Prospect 0171

MILWAUKEE 4
Steel Sales Corporation
647 West Virginia Street
Tel. Daly 8-6840

MINNEAPOLIS 15
Steel Sales Corporation
529 South 7th Street
Tel. Nestor 6614

MONTREAL 1
Robert W. Bartram, Limited
455 Craig Street West
Tel. University 3711

NEW HAVEN 13
Whitehead Metal Products Company, Inc.
265 Church Street
Tel. New Haven 8-0275

NEW ORLEANS 12
Metal Goods Corporation
432 Julia Street
Tel. Canal 7373

NEW YORK 14
Whitehead Metal Products Company, Inc.
303 West 10th Street
Tel. Watkins 4-1500

PHILADELPHIA 40
Whitehead Metal Products Company, Inc.
1955 Hunting Park Avenue
Tel. Baldwin 9-2323

PITTSBURGH 33
Williams and Company, Inc.
901 Pennsylvania Avenue
Tel. Cedar 1-8600

PORTLAND 12, ORE.
Eagle Metals Company
2336 North Randolph Avenue
Tel. Tuxedo 8201

ST. LOUIS 10
Steel Sales Corporation
4565 McRee Avenue
Tel. Grand 5255

SALT LAKE CITY 4
Pacific Metals Company, Ltd.
1186 South Main Street
Tel. Salt Lake City 8-3421

SAN DIEGO 1
Pacific Metals Company, Ltd.
1533 India Street
Tel. Franklin 9-5826

SAN FRANCISCO 10
Pacific Metals Company, Ltd.
3100 Nineteenth Street
Tel. Mission 7-1104

SEATTLE 4
Eagle Metals Company
3628 East Marginal Way
Tel. Eliot 4764

SPOKANE 8
Eagle Metals Company
East 310 Trent Avenue
Tel. Madison 2419

SYRACUSE 4
Whitehead Metal Products Company, Inc.
207 W. Taylor Street
Tel. Syracuse 3-0158

TOLEDO 2
Williams and Company, Inc.
650 East Woodruff Avenue
Tel. Adams 8101

TORONTO 5
Alloy Metal Sales Limited
881 Bay Street
Tel. Princess 2531

TULSA 3
Metal Goods Corporation
302 North Boston Street
Tel. Tulsa 4-1175

VANCOUVER, B. C.
Wilkinson Company, Ltd.
Tel. Fairmount 6101
190 West Second Avenue

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N.Y.

Progress—But Slow

For weeks to come heads of many industrial companies are going to be chafing at the bit because they can't do what they want to do. They want to keep the men and machines in their plants busy. Some already are and more will be stymied in this desire because shortages of materials or government restrictions force curtailment of activity on civilian orders and because the volume of war orders is not yet sufficient to take up the slack.

Hundreds of companies in the metalworking field already have been forced to lay off some employees. This situation is bound to get worse before it gets better. We must go through this disagreeable ordeal because months ago, when the nation could have been setting up adequate plans for the swift conversion of facilities, our government badly underestimated the size and timing of the job. We were told that the existing government agencies could do it satisfactorily. The President sent a boy to do a man's work.

Fortunately events in Washington during the past few days afford hope that the government at long last is awakening to the needs of the hour. Defense Mobilization Chief Charles E. Wilson is being given more authority. Last Wednesday President Truman established a Defense Production Administration which will function under Mr. Wilson. This and other recent actions go a long way toward removing authority from the various executive departments and concentrating it in Mr. Wilson's office. This should help to dispel confusion and to speed action.

In the meantime, if Mr. Wilson's mobilization efforts are to be successful, he must be given more definite specifications as to what is needed to meet the present crisis. These specifications have not been furnished in quantity by the military because our foreign policy is not clearly formulated. The divergent views of Truman, Acheson, Dewey, Hoover, Dulles and others must be weighed and a definite policy established that will command the support of a substantial majority of Congress and of the people.

War orders are beginning to flow to metalworking companies in increasing volume. They could flow more freely if we could make up our minds as to how, where and when we are to conduct our defense against the enemy.

* * *

A LOOK AT TITANIUM: "Must" reading in this issue is "Titanium—How It Fits In Your Tomorrow," by Associate Editor A. H. Allen. It deals with the fascinating developments which have followed the announcement on Sept. 14, 1948, by du Pont that it had succeeded in extracting titanium from its ores on a commercial basis.

Titanium is commanding major attention because it seems to satisfy a current need in the field of structural materials. It exhibits exceptional strength per unit weight at normal temperatures and unmatched resistance to corrosion—qualities urgently sought in aircraft and marine applications. Problems of ore reduction and melting to date have restricted output to about 2000 pounds per day, most of which is commandeered by the military.

That the bottleneck of production may be broken soon is indicated by the roster of important companies that are spending millions on the problem. Supplying titanium, in addition to du Pont, are National Lead in collaboration with Allegheny Ludlum Steel, Remington Arms working jointly with Crucible Steel of America, Kennecott Copper co-working with New Jersey

(OVER)

Zinc, and P. R. Mallory & Co. Republic Steel, Sharon Steel and Universal-Cyclops have rolled titanium experimentally. Among fabricators which have worked with titanium are Transue & Williams, Pratt & Whitney, Douglas Aircraft, Curtis Propeller, General Electric, Westinghouse Electric, American Welding & Mfg. Co. and Linde Air Products. Government and private research organizations are striving feverishly to speed progress in titanium.

These developments will bear watching. Titanium may be an exceedingly important metal of tomorrow. —p. 54

* * *

EAST'S NEW LEVERAGE: Latest count on expansion of steel ingot capacity in the United States puts total capacity at the end of 1952 nearer to 113 million tons than to the 110 million previously estimated. The upward revision in outlook for steel capacity is accompanied by a corresponding boost in capacities of rolling and finishing facilities.

A major project contributing to the revised estimate is the new steelworks planned by National Steel Corp. on a site adjacent to the Delaware river 10 miles south of Camden, N. J. This site is not too far downstream from U. S. Steel's new Fairless works, construction of which will begin in a few months. Finished steel will be shipped from the Fairless works within six to 12 months after construction work starts.

These two Delaware river projects will exert a strong counter leverage against the western drift of steel capacity occasioned by recent expansion in the Southwest and Far West. —p. 25

* * *

EXPENSIVE EXPEDIENT: Shipment of iron ore by water from upper to lower ports of the Great Lakes constitutes the smoothest and most economical transportation service in the world. This year, for various reasons, this service has not been equal to demand. During the last summer, U. S. Steel augmented its lake shipments by 1.5 million tons of ore brought down by rail.

Now the corporation is planning to ship 2 million tons by all-rail during winter months. Half will go to Pittsburgh, a quarter to Youngstown and an eighth each to Gary and South Chicago. This is an ambitious undertaking and one that could not be justified except under emergency conditions. It is an excellent illustration of the lengths to which private industry will go to meet a challenge when the chips are down. Handling frozen ore in gondolas is not child's play and it's expensive. —p. 27

* * *

TRY THIS CHECK LIST: Last week our editors spent an ungodly number of man-hours trying to reconcile the various government control orders with the numerous amendments, directions, supplements and delegations issued after the initial ukases (ukase is from the Russian) went out. On the basis of this hectic experience, they decided to inaugurate for the duration a weekly checklist, by which readers can keep abreast of the current status of governmental control orders.

In this week's issue is presented the list for all orders and their subsequent modifications for the last four months to date. Hereafter in each issue the new orders and changes of old orders during the week will be reported. We think this service will help you to detect promptly any alterations in orders which affect your business. This may turn out to be a formidable task, but we're prepared to go through with it to the limit of our abilities. —pp. 30, 31

* * *

AUTO GADGETS GALORE: General Motors has been developing a "dream" car in which is incorporated many advanced ideas that may or may not find acceptance in stock models of the future. This car of tomorrow, named Le Sabre, exists only as a plaster model, but in the next few months it will be built in metal.

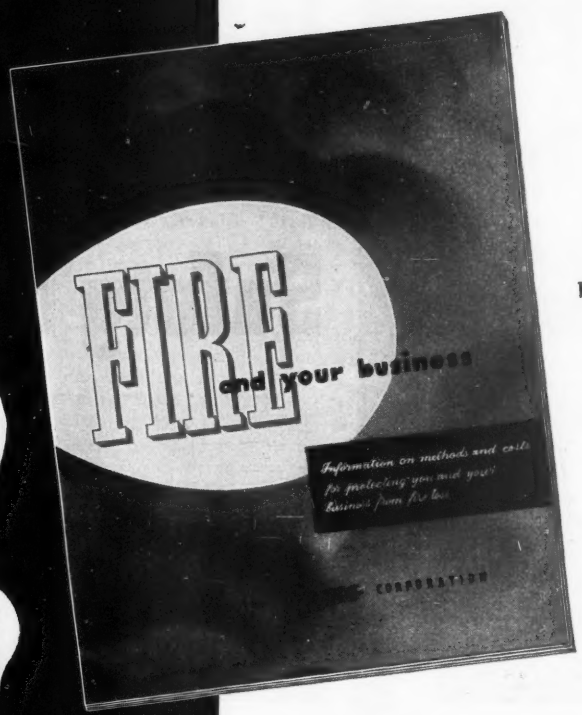
It will utilize lightweight aluminum and magnesium alloys in body and engine. Its 300-horsepower engine will be fed by a dual fuel system supplying premium gasoline and methyl alcohol. It will have two batteries to power Le Sabre's unusual electrical devices. The instrument panel will look like that of an airplane. Doors and windows will be electrically controlled and—hold your breath!—built-in hydraulic jacks for each wheel can be controlled from the instrument panel. Also the convertible top will go up automatically when rain hits a sensitized spot between the seats.

Ye gods, what luxury! Yet much stranger things have come to pass. —p. 39

E. L. Shaner

EDITOR-IN-CHIEF

It's 3 to 1 that a major fire will close your plant forever



Am I paying too much for the fire protection I'm getting?

What is the most effective method of fire protection available today?

Where can I find out about this protection?

Is it expensive?

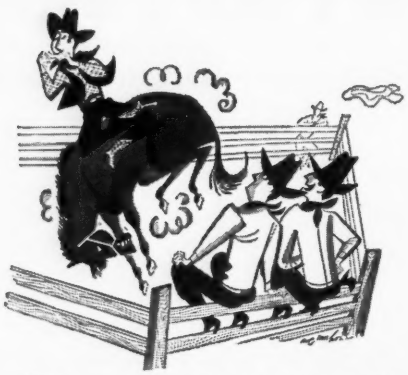
You'll find the answers to these questions . . . and a host of others in Viking's new brochure, "Fire and Your Business" . . . sixteen pages of practical, factual, useful information that tells you the how, when, where and why of sprinkler protection. Between the covers of this booklet is a store of information that you can apply directly to your plant no matter whether it's large or small . . . information that shows you how to get the maximum in fire protection at the minimum in cost. Don't gamble with fire. "Fire and Your Business" contains the information that will put the odds in your favor. Write for your copy today.

Don't gamble with fire — the odds are against you.

the VIKING corporation

HASTINGS, MICHIGAN

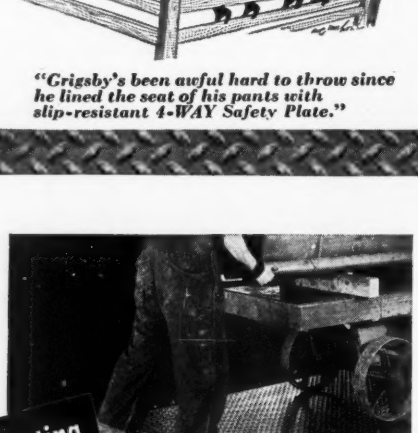
OFFICES IN PRINCIPAL CITIES

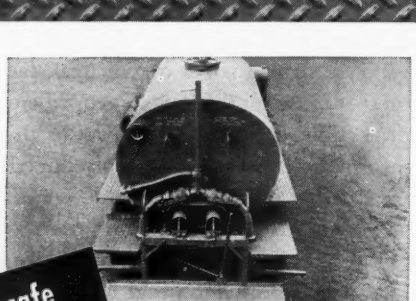


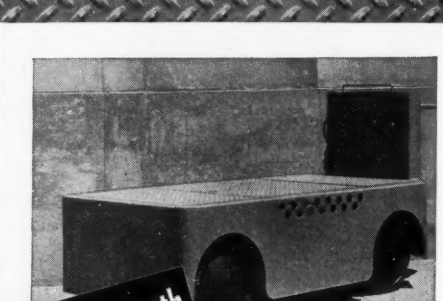
"Grigsby's been awful hard to throw since he lined the seat of his pants with slip-resistant 4-WAY Safety Plate."

For greater safety under foot, in your plant and on your products

Inland 4-Way® Safety Plate







INLAND

INLAND STEEL COMPANY, Dept. S10
38 South Dearborn Street • Chicago 3, Illinois
Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis and St. Paul

STOCKED BY LEADING STEEL WAREHOUSES

New Bulletin with New Ideas—

Just Out! Bulletin F1. Complete engineering and application data. *Send for it!*

STEEL
A PENTON PUBLICATION

Steel Expansions Mount

Programs underway or projected will hike the ingot capacity to 113 million tons, not 110 million as first estimated. Most will be finished by the end of 1952

CONSTRUCTION underway or projected will boost America's steel ingot capacity to nearly 113 million tons. Most of the expansions will be completed by the end of 1952. As originally estimated, the ingot capacity would have been only 110 million tons two years from now.

Steel expansion programs planned in mid-1950 would have boosted capacity by the end of 1952 by 9.4 million tons. The Korean war and the fast amortization provision approved last September in the new tax law have spurred construction plans, and programs now revealed will hike the steelmaking potential by more than 12 million tons.

Big Chunk—The first 19 steel programs to be approved for five-year tax write-offs by National Security Resources Board will add 7 million tons to ingot capacity (STEEL, Dec. 18, p. 65). U. S. Steel Corp. has just received approval on several projects. They and other U. S. Steel expansions will boost the potential another 4 million tons by the end of 1952. Largest U. S. Steel program will be the Morrisville, Pa., works which eventually will be able to produce 1.8 million ingot tons a year.

Boosting the expansion in steelmaking potential to more than 12 million tons may be National Steel Corp.'s projected mill in New Jersey (first revealed in STEEL, Dec. 25, p. 28) and additional programs to be undertaken by other companies. National has not announced the size of its new mill, but it will be large.

Not Neglected—Finishing facilities won't be forgotten in the steel expansion program. Some of the cost of the projects approved for fast amortization will be for end-product equipment. U. S. Steel's $443.8 million program—a certificate of necessity for five-year write-off was approved for much of it Dec. 28—includes finishing facilities, notably at Morrisville.

On Dec. 28 NSRB also issued certificates on part of these programs which will include finishing equipment: Wheeling Steel Corp., $8,750,000; Allegheny Ludlum Steel Corp., $5,266,000; Jones & Laughlin Steel Corp., $2 million; Thomas Steel Co., $1,142,417.

National Steel To Build in Jersey

National Steel Corp. will build a steel mill on tract of more than 2000 acres on deep water of the Delaware river in New Jersey about 10 miles south of Camden.

Plans are being developed to determine what steel products the new plant will make. No date has yet been set for the start of construction. National's present ingot capacity is 4.5 million tons a year. A program of expansion now underway at various other National operations will be largely completed early in 1952 and will increase the company's capacity to 5.5 million tons. That total will be further increased by the capacity of the proposed new operation. Iron ore for the eastern plant's blast furnaces will be transported directly in ocean-going carriers from the Labrador-Quebec ore field.

Morrisville Job Starts in Spring

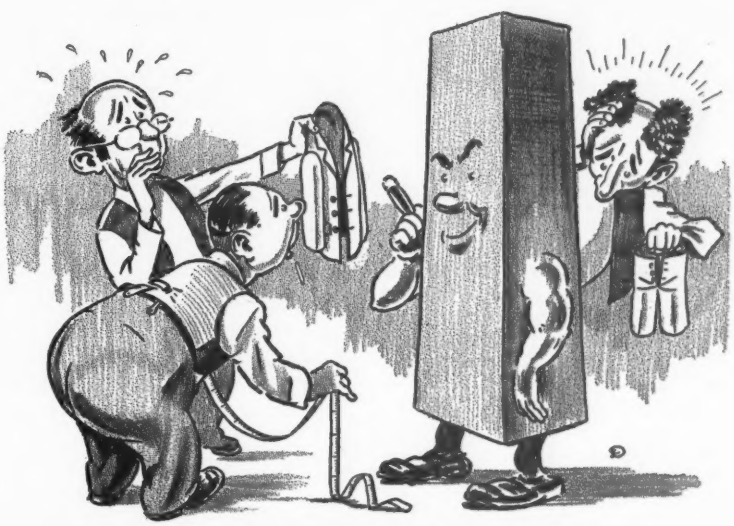
U. S. Steel Corp.'s new Fairless works at Morrisville, Pa., opposite Trenton, N. J., on the Delaware river will start rising sometime early next spring.

Within six to twelve months after construction work begins, the first finished steel products are expected to start rolling out of the seaboard plant.

The Fairless works will have an initial annual capacity to produce 289,000 tons of cold-rolled sheets, 235,000 tons of hot-rolled sheets, 281,000 tons of standard pipe, 285,000 tons of bar products and 170,000 tons of tin mill products.

Among principal facilities will be a coke and coal chemical plant, including two 85-oven byproduct coke batteries with an annual capacity of 916,000 tons of coke and additional tonnages of coal chemical products; two blast furnaces with an annual capacity of 1.2 million tons of pig iron; nine open-hearth furnaces with an annual capacity of 1.8 million tons of ingots; an 80-inch hot strip mill and hot strip finishing facilities; finishing facilities for cold-rolled sheets and tin plate; a bloom-slab mill and auxiliary facilities; a billet mill and auxiliary facilities; and a bar mill with a size range from ⅜ inch to 2 inches.

National Tube will install facilities at Morrisville to produce standard pipe, including a skelp mill, two Fretz-Moon continuous butt weld pipe mills to produce 281,000 tons of ½-inch to 4-inch butt weld pipe annually, pipe galvanizing facilities



Seel Growth: Another Measurement Needed

TELESCOPIC TUNNEL FORMS: The Vernon, Calif., plant of Consolidated Western Steel Corp. fabricated these steel tunnel forms that will be used on San Francisco's Broadway tunnel. When concrete is poured in the 45-ton steel forms, the 14-ton hydraulically operated traveler (inside the form) moves the steel forms in place. While the concrete is setting around one form, the traveler is used to collapse the other and expand it in place for the next pour

and a warehouse of 30,000 tons capacity.

National Tube will operate the pipe-producing portion of the new plant, while the remainder of Fairless works will be operated by U. S. Steel Co., formed Jan. 1 from the merger of Carnegie-Illinois Steel Corp., U. S. Steel Corp. of Delaware, H. C. Frick Coke Co. and U. S. Coal & Coke Co.

The new plant will eventually use part of the high grade ore from Venezuela. Pending the availability of Venezuelan ore, the works will utilize other foreign ores as well as domestic ore.

Some 4400 production workers will man the plant whose markets will be mainly in the Middle Atlantic, New England and overseas areas.

Extrusion Tube Plant for Gary

National Tube will install a large extrusion plant to manufacture high alloy seamless specialty tubes, as well as shapes and bars, at its Gary, Ind., works. The application of the extrusion process on a commercial basis to the manufacture of seamless steel tubes is an innovation in the U. S.

The facilities, which will be housed in an existing building at the plant, will consist of a 2500-ton hydraulic extrusion press and related facilities to make tubes ranging from 1½ to 6½ inches in diameter with wall thicknesses up to ¼ inch and lengths up to 60 feet. The new installation will also be capable of producing various shapes and bars from ½ inch to 4½ inches. The extrusion plant will have a capacity of about 3000 tons of special tubes and shapes per month. Operation of the facilities should be possible before the end of 1951.

The French Ugine-Sejournet process for the hot extrusion of metals, using glass as a lubricant, will be employed in the operation.

Geneva Boosts Capacity

U. S. Steel's Geneva Steel Co. will boost its annual steelmaking capacity from 1.4 million to 1,560,000 tons in about a year.

Facilities to be added include one open hearth, two overhead cranes, and one two-hole soaking pit furnace. When the project is completed, Geneva will have ten open hearths and 16 soaking pit furnaces.

Blast Furnace To Be Expanded

Blast furnace capacity at the Ohio works of U. S. Steel Co. in Youngstown will be increased by 112,000 tons a year with the rebuilding and enlarging of the plant's No. 5 furnace. Work on the unit and installation of two turbo-blowers will be completed by next summer. The stack's daily rated capacity will be increased by more than 300 tons.

TCI To Add 500,000 Tons

Tennessee Coal, Iron & Railroad Co. will increase ingot capacity 500,000 tons by additional open hearths and auxiliary facilities. The expansion will raise the capacity of this U. S. Steel subsidiary from 2,850,000 tons to 3,350,000 tons.

Blast furnace output will be raised through the blending of rich imported ores with the lower grade Alabama ores. To handle foreign ore imports, including eventual shipments from Venezuela, ore transfer facilities will be installed on a 36-acre tract in Mobile, Ala., acquired last summer.

TCI obtained a certificate of necessity for $41,525,000.

Pittsburgh Area Capacity Rises

The Pittsburgh district boosted its ingot capacity by more than 1 million tons in 1950 and plans now under way or projected will hike the potential still more in 1951 and 1952. The area's capacity is now 20,151,000 tons, compared with 19,147,000 tons a year ago.

Pittsburgh Steel Co. is increasing its ingot capacity at Monessen, Pa., by 50 per cent to 1,560,000 tons. It has received approval on fast amortization of the cost of enlarging twelve 140-ton open hearths to 225-ton units.

Crucible Steel Co. of America is enlarging 11 open hearths and 4 electric furnaces at Midland, Pa. At the end of the year, its capacity was up 40,314 tons to 1,095,011.

Universal-Cyclops Steel Corp. will increase its electric furnace capacity this year from 54,120 tons to 70,160 tons.

In the Wheeling area, capacity in 1950 was boosted 490,000 tons, due in part to a 204,000 ton expansion by Wheeling Steel Corp. and rehabilitation of four open hearths at the Toronto, O., plant formerly owned by Follansbee Steel Corp. Weirton Steel Corp. has expansions in progress, some of which have already been completed.

Jones & Laughlin Steel Corp.'s previously revealed program will boost its capacity in Pittsburgh by 1.2 million tons by installation of 11 open hearths.

U. S. Steel Corp. has projects underway in Pittsburgh and Youngstown which will boost the areas' capacity by 1,660,000 tons. Much of the program is already completed.

Wheeling Steel has received approval for fast write-off of $8,750,000, much of which will be used to build a new coke oven battery.

U.S. Steel Ships Ore through Winter by Rail

Two million tons will be moved from Upper Lakes to Pittsburgh, Youngstown, Gary and South Chicago by March to bolster short water shipments

TO BOLSTER its iron ore supplies, U. S. Steel Co. (Carnegie-Illinois Steel Corp. until Dec. 31) has just initiated all-rail shipment from Duluth and Two Harbors, Minn., to its Pittsburgh, Youngstown, South Chicago, Ill., and Gary, Ind., plants. This is the first time in history such an effort has been undertaken between lake shipping seasons.

Goal—The object will be the shipment of 2 million tons before Mar. 15, with 1 million to go to Pittsburgh, 500,000 to Youngstown and 250,000 tons each to South Chicago and Gary. U. S. Steel in its first summer all-rail shipments inaugurated in July and concluded in November added 1.5 million gross tons to its ore piles.

The ore will be brought down direct from the Proctor yards of the Duluth, Misabe & Iron Range Railroad to the various points. That railroad's ore cars will be used, giving them activity they otherwise would not have. Normally they are idle in the Proctor yards during the winter. Such use of these cars has the further advantage of not placing a drain upon standard freight car supply.

Big Thaw—At each destination, the cars will undergo thawing. Steam equipment has been provided and the thawing will be accomplished by inserting through poke holes in the cars steam lances or lengths of perforated pipe attached to hoses through which steam is forced.

First shipment of ore—49 cars—arrived in the Chicago district Jan. 2. Because of lack of space and necessary facilities at the South Chicago and Gary plants, all winter shipments will be handled at 101st St. and the Calumet river. Here the ore will be thawed out, unloaded and reloaded into barges which will deliver it to the South Dock at South Works and to the docks in Gary.

Contracting Job—All of the work is being performed by outside concerns under contract. Seven tracks are available, three of which are currently having thawing equipment installed. The remaining four tracks without thawing equipment will be needed for working space. Each thawing track, approximately 1000 feet long, will accommodate 40 cars with 60 tons to the car.

The thawing equipment is a single large-diameter steam pipe running along each side parallel to the railroad tracks. From this pipe, smaller pipes, called steam lances, branch off to carry the steam into the cars. Standard ore cars have holes in their sides to receive lances. In the South Chicago installation, the lances are not perforated but have solid sides with swaged ends. The method of thawing is the same as used at the docks in Minnesota.

Getting Up Steam—Installation of 250 thawing units, each with four lances, is being done by the Chicago Concrete Breaking Co. Steam is being provided by four old locomotives leased from the Chicago, Burlington & Quincy Railroad. Length of time required to thaw the ore remains to be determined.

The ore after thawing will be unloaded on a belt conveyor which will load it into the barges. For this purpose, United States Steel Co. has leased the facilities and personnel of the Rail-To-Water Transfer Corp. which is adjacent to the thawing tracks. Tugs and barges are leased from Great Lakes Dredge & Dock Co.

Present ore stockpile of the company in the Chicago district is nearly 7 million tons of all types. With the rail shipments scheduled to continue until March 15, another half million tons is expected to be delivered. A year ago the stockpile was about 5.5 million tons.

Award Lakes Freighter Contract

Manitowoc Shipbuilding Co., Manitowoc, Wis., was awarded a $6 million contract to build a Great Lakes freighter for American Steamship Co., Buffalo, N. Y.

The new self-unloader is to have a keel of 627 feet which will be laid at Manitowoc next fall. The ship is scheduled for completion by the start of the 1953 navigation season. Capacity will be 18,000 gross tons. Discharge rate will be from 2500 to 3000 tons per hour and speed with cargo will be 16.5 mph.

Inland To Lengthen Boat

Inland Steel Co. will stretch the capacity of its ore carrying fleet of five Great Lakes vessels by lengthening the hull of one of its older boasts, the *Philip D. Block,* while it is laid up this winter.

The *Block,* built in 1925, will be opened amidship for addition of 72-foot new midsection extending its length from 600 to 672 feet. This will bring it within 6 feet of length of the *Wilfred Sykes,* Inland's flagship and largest vessel on the lakes. The reconstruction to be completed by Apr. 1 will give ship ore capacity in excess of 14,000 gross tons against

MORE BOTTOMS: The lack of lake carriers is one of the reasons why U.S. Steel is bolstering its ore supplies by all-rail shipments. One of the many bottoms that will alleviate the ore shortage is this keel plate being moved into position for construction of hull No. 867, a 19,600-ton capacity carrier for Pittsburgh Steamship Co. Shaking hands in the center of the picture are Walter C. Hemingway, president of Pittsburgh, and W. H. Gerhauser, president of American Shipbuilding Co. Scene is at the Lorain, O., works of American Shipbuilding

its average cargo for 1950 season of 12,800 tons.

Lengthening will be done by American Shipbuilding Co. at its South Chicago yards.

For a normal season which permits a vessel 33 trips between the company's Indiana Harbor plant and ore loading docks at Superior, Wis., the vessel should carry 468,000 gross tons against the 422,000 tons it floated in 1950.

Taconite Pellets Tested

Tests are being made at Youngstown Sheet & Tube Co.'s Campbell, O., plant with iron pellets extracted from taconite.

About 35,000 tons of the pellets have been shipped from Minnesota to the local plant. Mixed with some direct shipping iron ore, that represents about a month's supply for one blast furnace.

Some of the iron pellets are being smelted in a blast furnace, and some also will be used as open-hearth charge ore, to determine its value.

The iron pellets were produced by the Erie Mining Co. in its taconite processing plant.

Iron and steel experts are carefully watching the Campbell works tests, which may enable the furnaces to increase their yield and cut coke consumption per ton of iron produced, because of the high (68 per cent) iron content of the pellets.

November Pig Iron Output Off

The nation's blast furnaces turned out 5,386,838 net tons of pig iron, ferromanganese and spiegeleisen in November, to operate at 91.4 per cent of capacity. In October, 5,924,427 tons were produced, and 97.4 per cent of the capacity was utilized.

Scrap Men To Hear De Seversky

"More scrap for more steel for defense" will be the theme of the Institute of Scrap Iron & Steel's convention opening in Hotel Commodore, New York, Jan. 14. A feature of the convention will be an industrial exhibit by suppliers of machinery used by the scrap industry.

Maj. Alexander P. de Seversky, aviation authority, will be the banquet speaker.

Military Contracts Up

GM leads all companies with 49 contracts totaling more than $138 million

MORE THAN 6200 contracts awarded to about 3200 American companies for military needs valued at upwards of $1.6 billion were announced through the Office of Small Business of the U. S. Department of Commerce during the first five months of the Korean War.

Those figures were disclosed with the publication of a new Directory of U. S. Government Contracts and Contractors by U. S. Bid Information, a private company supplying a daily bid information service to subscribers throughout the U. S. The directory discloses that 2366 contracts—more than one-third of the total—were for $50,000 or less.

The Top 25—General Motors Corp. led all others with 49 contracts totaling more than $138 million. But the company awarded the greatest number of contracts was Bendix Aviation Corp. and affiliates, with 107 orders totaling more than $42 million. The top 25 companies, with number of contracts and total dollar values of contracts, are:

Company	No. of Contracts	Total Value
General Motors Corp.	49	$138,308,027
Republic Aviation Corp. ..	10	97,989,151
Lockheed Aircraft Corp. ..	18	58,979,937
Douglas Aircraft Co., Inc.	17	46,865,644
Bendix Aviation Corp. ...	107	42,125,606
Willys-Overland Motors ..	13	39,806,425
Ford Motor Co.	2	36,413,854
Winston Brothers Co.	1	30,800,000
American Car & Foundry..	1	30,000,000
Wright Aeronautical Corp.	9	26,499,581
North American Aviation Inc.	15	17,894,456
General Electric Co.	54	17,116,159
Standard Oil Co. (N.Y.)..	10	14,248,351
Standard Oil Co. (Calif.).	20	13,217,007
Sperry Corp.	21	12,169,083
Lycoming-Spencer Div. Avco Mfg. Corp.	3	11,591,593
Boeing Airplane Co.	11	11,585,883
Pioneer Parachute Co., Inc.	6	10,996,577
Continental Motors Corp. .	5	10,232,836
Federal Telephone & Radio Corp.	7	10,156,803
Goodyear Tire & Rubber Co. Inc.	34	9,408,640
American Woolen Co.	3	9,391,762
Continental Oil Co.	5	9,240,698
Federal Cartridge Corp. ..	1	8,603,500
Western Electric Co.	19	7,305,657

Big Spender — During the five months of July through November, 1950, Department of Defense obligated more than $9.2 billion for the procurement of major materiel and supplies. Total obligations during the period, including military pay and allowances, civilian employment, research and development and other services were about $14.1 billion.

Here is Department of Defense's summary of major procurement obligations for July through November:

Materiel & Supplies	Total Value
Aircraft	$4,600,000,000
Ammunition and Guided Missiles	900,000,000
Engineer Supplies and Equipment	180,000,000
Clothing and Equipage	220,000,000
Electronics and Communications	410,000,000
Petroleum, Oils and Lubricants.	190,000,000
Ships	165,000,000
Subsistence	345,000,000
Tank-Auto	1,060,000,000
Transportation Equipment	15,000,000
Weapons	320,000,000
Other Equipment and Supplies .	590,000,000
Construction	215,000,000
GRAND TOTAL	$9,210,000,000

November obligations partially estimated.
All figures rounded.

FIRST TURBOPROP TRANSPORT: Undergoing taxi tests in San Diego, Calif., this Convair-Turboliner was built by Consolidated Vultee Aircraft Corp. for the Allison Division of General Motors Corp. It's a research transport purchased by Allison to test its turboprop engines in a modern commercial plane. Two 2750-horsepower Allison 501 turboprop egines are installed in the Turboliner. The planer is a modified 40-passenger, twin-engine Convajr-Liner commercial transport, fleets of which are used by domestic and foreign airlines

Fighter Planes De-Mothballed

Pacific Airmotive Corp., Burbank, Calif., has received an additional order from Air Materiel Command at Dayton, O., to de-mothball and reactivate an undisclosed number of F-51 Mustang fighter planes.

The order is in addition to the recently completed F-51 contract received in July. The mothballed planes, now at Kelly Field, Tex., will be

flown to Burbank by Pacific Airmotive pilots.

Garrett Enters Research

Garrett Corp., Los Angeles, is establishing a new division, to be called Airesearch Mfg. Co. It will build a $1.5 million plant in Phoenix, Ariz., to manufacture air turbine refrigerator and cabin pressure controls.

Allocations for Scrap

Ceiling prices considered. Rollbacks possible. Nation-wide pool to be created

A NATIONAL iron and steel scrap pool will be created under direction of the National Production Authority and allocations made to consumers as needed.

Heavy snowfalls in many areas have disrupted ferrous scrap collections. Reports to NPA indicate that the inventory situation is spotty, but that the overall supply is adequate to maintain full steelmaking and foundry operations, provided distribution is equitable.

All consumers and dealers in scrap will be asked to report on requirements and inventories.

NPA will draft six more men from the scrap industry to direct the allocation program.

Ceiling Prices Coming? — Scrap men, steel executives, foundry operators and railroad representatives held a two-day conference with officials of the Economic Stabilization Agency last week to discuss proper price differentials on ferrous scrap between cities and between grades. The aim is to revise the OPA scrap schedules of World War II and again put them into effect.

Industry men made a strong case for the need of ceiling prices that would encourage all present collectors to stay in business and bring scrap to the market. They pointed out that only adequate prices would keep these collectors in business.

Rollbacks Possible — Consensus is that open hearth grade prices are about right and that if any price rollbacks are ordered they will apply to certain specialties, including some railroad items.

Final decisions on scrap prices were deferred until Jan. 11 when another conference will be held to determine future policy.

New England Petitions for Plant

New England Steel Development Corp. has asked the government for authority to build a $250 million steel plant at New London, Conn., with an annual capacity set at 1 million tons.

A loan from Reconstruction Finance Corp. would be necessary if a new company would have to be formed to operate the plant. Probably no existing company will touch the New England project now that U. S. Steel and National Steel will build in the East.

Coal for the proposed mill would come from West Virginia and iron ore from Labrador.

SITUATION WELL IN HAND: Standing together at a dinner given by the American Ordnance Association in honor of the U.S. Marine Corps are (left to right): E. R. Godfrey, vice president of General Motors; Louis Polk, president, Sheffield Corp., Dayton, O.; Gen. Clifton B. Cates, U.S. Marine Corps commandant; and Col. James L. Walsh, president of the AOA. General Cates was the principal speaker at the association's dinner at the Waldorf-Astoria in New York. Mr. Polk was elected a member of the technical committees and divisions of the association, effective the first of this year. Mr. Godfrey was elected a member of the national board of directors

Heppenstall Buys Forging Unit

Heppenstall Co., Pittsburgh, has purchased from Harkit Corp. the William Leard Corp's plant in New Brighton, Pa., 33 miles northwest of Pittsburgh. The facility will be used to produce steel forgings.

Heppenstall, a producer of high-quality alloy steels, may eventually convert the plant for specialized production of forged steel alloy disks used in jet aircraft engines and gas turbines.

In that case, several high frequency melting furnaces would be installed, so that the complete disk-production process from original ingot to machined forging could be carried out in the plant.

Munitions Board Reorganizes

Start has been made on the long-expected reorganization of the Munitions Board.

Maj. Gen. Francis H. Griswold is to replace Maj. Gen. P. W. Timberlake as director of the Munitions Board's staff. The latter will be switched to the former's post of deputy chief of staff for materiel, Air Force. Those to remain with the Munitions Board include Rear Adm. Morton L. Ring, director of supply management, and Maj. Gen. J. V. Matejka, director of production management.

M-H Expands in Philadelphia

Minneapolis-Honeywell Regulator Co., through purchase of the three-story Thomas M. Royal plant and 60,000 sq ft of undeveloped land, is starting another expansion of production and operating facilities in Philadelphia, location of its Brown Instruments Division. Brown employment is near 2000, or 20 per cent above the World War II peak. This expansion is the second in less than 2 years, this division having taken on 69,000 sq ft of additional space in May, 1949. Addition of the new building will add 110,000 sq ft.

A Checklist on Controls

GETTING confused by all the regulations, price orders, wage orders, materials orders, amendments, supplements, directions, delegations and notices being issued by the defense agencies? Here is a simplified checklist to help you keep track of the regulations and orders affecting your industry. It lists all those issued to date. Next week and every week thereafter, STEEL's checklist will keep you up to date on government controls.

NPA Regulations

Inventory Controls

REGULATION 1 limits to "a practical minimum working inventory" the quantities of various ferrous and nonferrous metals and minerals, chemicals, building materials, textile materials, rubber materials and forest products that can be ordered, received or delivered. Effective Sept. 18, 1950. NPA Reg. 1.

Interpretations 1, 2 and 3 cover methods of adjusting orders, extent of imported materials exemption, and deliveries of goods through intermediate distributors. Issued Nov. 10, 1950. NPA Reg. 1, Interpretations 1, 2 and 3.

Priorities

REGULATION 2 establishes broad priorities system. Defense Orders (DO) ratings authorized by the Defense Department and Atomic Energy Commission. Rated orders apply not only to prime contractor but are extendable by him to suppliers of materials, products and components used in end item. The regulation sets forth: Basic rules of the priorities system; defines use of ratings; the method of application or extension of ratings; special provisions applicable to rating extensions; rules for acceptance or rejection of rated orders; reporting of improperly rejected orders, cancellation of ratings; sequence of filling rated orders; delivery or performance dates; use and disposition of material acquired under the regulation; intracompany deliveries; inventory restrictions; damage claims; records, reports, audit and inspection; violations; adjustments and exceptions. NPA Reg. 2. Effective Oct. 3, 1950.

Delegation 1 permits Department of Defense to assign DO ratings. NPA Delegation 1 under Regulation 2. Effective Oct. 3, 1950. As amended Nov. 1, 1950, permits Department of Defense to redelegate authority to other government agencies.

Amendment 2 gives the Defense Department authority to issue DO ratings for construction equipment for use in overseas construction projects. NPA Delegation 1, as amended Dec. 29, 1950. Effective Dec. 29, 1950.

Delegation 2 as amended broadens authority of Atomic Energy Commission to permit use of DO ratings for certain plants serving AEC but not owned or operated by that agency. NPA Delegation 2 as amended Nov. 2, 1950.

Delegations 3 and 4 give authority to assign DO ratings to National Advisory Committee for Aeronautics and U. S. Coast Guard. Effective Nov. 8, 1950. NPA Delegations 3 and 4.

Delegation 5 makes Interior Department claimant agency for mining machinery. NPA Delegation 5. Effective Dec. 18, 1950.

Joint Priorities with Canada

REGULATION 3 provides for extension of DO ratings to Canadian firms doing defense work on reciprocal basis. NPA Reg. 3. Effective Nov. 8, 1950.

Materials Orders

STEEL—M-1 sets forth rules for placing, accepting and scheduling orders for steel products that have been assigned a DO rating. It sets lead time for mill scheduling and places ceilings on acceptance of rated orders, based on both product and total tonnage. NPA Order M-1. Effective Oct. 12, 1950.

Amendment 1 provides for scheduled programs for steel for specific purposes. NPA Order M-1, as amended Oct. 26, 1950.

Amendment 2 revises lead time on DO orders for steel. NPA Order M-1, as amended Dec. 1, 1950.

Supplement 1 schedules steel for freight car program. Supp. 1 to M-1. Effective Oct. 26, 1950.

Supplement 2 schedules steel for Great Lakes vessels. Supp. 2 to M-1. Effective Nov. 15, 1950.

Supplement 3 schedules steel for Canadian freight car program. Supp. 3 to M-1. Effective Dec. 15, 1950.

RUBBER—M-2 revises rubber limitation and conservation order. NPA Order M-2. Effective Nov. 1, 1950.

Amendment 1 reduces natural rubber consumption 50 per cent in January and February, 1951, from November, 1950, level. NPA M-2, as amended Dec. 11, 1950. Effective Jan. 1, 1951.

Amendment 2 provides General Services Administration will be sole importer of crude natural rubber or natural rubber latex. NPA Order M-2, Amendment 2. Effective Dec. 29, 1950.

COLUMBIUM BEARING STEEL—M-3 reserves entire production and use of columbium bearing stainless steels for defense needs. NPA Order M-3. Effective Oct. 19, 1950.

CONSTRUCTION—M-4 bans construction for amusement, recreational or entertainment purposes. NPA Order M-4. Effective Oct. 27, 1950.

Amendment 1 clarifies M-4 to permit construction underway to continue. NPA Order M-4 as amended Oct. 31, 1950.

Amendment 2 extends ban on amusement construction. NPA Order M-4, as amended Nov. 15, 1950.

ALUMINUM—M-5 establishes rules for handling DO ratings for aluminum. Provides ceilings for acceptance of rated orders. NPA Order M-5. Effective Oct. 27, 1950.

STEEL WAREHOUSES — M-6 establishes quotas for steel deliveries to warehouses, based on average monthly shipments during first nine months of 1950. Provides ceilings on DO rated orders warehouses are required to accept. NPA Order M-6. Effective Nov. 8, 1950.

Amendment 1 requires record keeping by producers and distributors. NPA Order M-6, as amended Dec. 1, 1950.

Amendment 2 allocates steel to Canadian warehouses. NPA Order M-6, as amended Dec. 15, 1950.

ALUMINUM — M-7 limits nondefense use of aluminum to 65 per cent of average used in first half of 1951. It limits inventories to 60 days' supply or practical minimum working inventory, whichever is lower. Reductions became effective Jan. 1, 1951. NPA Order M-7. Effective Nov. 13, 1950.

Amendment 1 eases restriction on nonrated aluminum use to 80 per cent in January and to 75 per cent in February. NPA Order M-7, as amended Dec. 1, 1950.

Direction 1 permits automatic adjustment in aluminum use in December. Dir. 1 to NPA Order M-7. Effective Nov. 28, 1950.

Direction 2 permits automatic adjustments in aluminum use in certain cases during first quarter of 1951. Dir. 2 to NPA Order M-7. Effective Dec. 16, 1950.

Direction 3 permits increase to 75 per cent of the amount of aluminum that can be used in manufacture of strictly functional component parts during March. Dir. 3 to NPA Order M-7. Effective Dec. 27, 1950.

TIN—M-8 tightens inventory controls on tin. It establishes rules for reporting on stocks, receipts, consumption and distribution. NPA Order M-8. Effective Nov. 13, 1950.

Amendment 1 schedules nonrated use of tin. NPA Order M-8, as amended Dec. 18, 1950.

ZINC—M-9 establishes rules for accepting and scheduling defense rated orders for zinc. Provides 30-day lead time and ceilings for acceptance of DO ratings. NPA Order M-9. Effective Dec. 1, 1950.

COBALT—M-10 establishes cobalt inventory control and directs distribution of imports. NPA Order M-10. Effective Nov. 30, 1950.

Amendment 1 provides virtually complete allocation of all forms of cobalt. Beginning Feb. 1, 1951, every purchase of more than 25 pounds will require NPA approval. NPA Order M-10, as amended Dec. 30, 1950. Effective Dec. 30, 1950.

COPPER, COPPER-BASE ALLOYS—M-11 schedules DO rated orders for copper and alloys, establishes lead time for accepting defense orders and provides ceilings for defense orders. NPA Order M-11. Effective Nov. 29, 1950.

COPPER, COPPER PRODUCTS—M-12 limits copper use in nondefense work to 85 per cent in January and February and to 80 per cent in March to average used in first half 1950. Foundry products allowed 100 per cent. NPA Order M-12. Effective Nov. 29, 1950.

Amendment 1 restricts use of copper in wide range of end products starting Mar. 1. It permits use of copper where it serves a functional purpose or where no satisfactory substitute can be used. In the amendment is a list of articles in which no copper can be used, including items in these categories: Builders' hardware, building materials, burial equipment, clothing and dress accessories, furniture and fixtures, hardware, home furnishings and equipment, household appliances, jewelry, gifts and novelties, motor vehicles, passenger transportation equipment and miscellaneous articles. NPA Order M-12, Amend. 1. Effective Dec. 30, 1950.

HIGH TENACITY RAYON YARN—Schedules DO ratings. NPA Order M-13. Effective Dec. 1, 1950.

NICKEL—M-14 limits nonrated use of primary nickel during first quarter, 1951, to 65 per cent of average during first half, 1950. Maintenance, repair and operating supplies to continue at 100 per cent. NPA Order M-14. Effective Dec. 1, 1950.

ZINC — M-15 limits nondefense consumption of zinc starting in January to 80 per cent of average used in first half of 1950. Limits inventories to 45-day supply or practical minimum working inventory, whichever is lower. NPA Order M-15. Effective Dec. 1, 1950.

COPPER SCRAP—M-16 provides for maintaining distributive channels for copper scrap. NPA Order M-16. Effective Jan. 1, 1951.

ELECTRICAL COMPONENTS—M-17 spreads DO-rated orders for certain electrical components. NPA Order M-17. Effective Dec. 18, 1950.

HOG BRISTLES—NPA Order M-18. Effective Dec. 21, 1950.

CADMIUM—M-19 limits use of cadmium and restricts inventories to 30-day supply. NPA Order M-19. Effective Jan. 1, 1951.

Price Regulations

NEW AUTOMOBILES—Regulation 1 freezes prices on new passenger cars at Dec. 1, 1950, levels until Mar. 1, 1951. ESA Ceiling Price Reg. 1. Effective Dec. 18, 1950.

Wage Regulations

NEW AUTOMOBILES—Regulation 1 stabilizes wages and salaries in the new passenger automobile manufacturing industry to Mar. 1, 1951. ESA Wage Stabilization Reg. 1. Effective Dec. 22, 1950.

Wage Procedural Regulations

WAGE INCREASES—Regulation 1 delineates procedures by which interested parties—employers, employees or labor unions—may file petitions for wage increases and the steps toward reaching decision on petition. ESA Wage Procedural Reg. 1. Effective Dec. 22.

Notices

HOARDING—Notice 1 issues list of materials subject to antihoarding provisions of the Defense Production Act of 1950. Included are most metals, many other materials. NPA Notice 1. Effective Dec. 27, 1950.

Want complete copies of these regulations and orders?

For NPA orders, write to United States Department of Commerce, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25.

For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temp. E Bldg., Washington 25. Identify orders by numbers as listed in this index.

Steel Needs Mount

Direct defense to take two million tons in first half. Tighter controls coming

LOOK for direct defense requirements to mount steadily this year. This will require review and revision of the present priority system. New orders will be issued. Existing ones will be revised.

An example of the increases to be expected is that in steel. Military and defense people now say that direct defense requirements will be at least two million tons in the first half of 1951. A few weeks ago they were figuring on only a million and a half.

More for Military—The M-1 order (steel) is being revised. More steel will be reserved for the military and that, of course, will make less available to nonrated consumers.

The tightening supply situation is reviving talk of earlier adoption of a controlled materials plan. Defense officials blow hot and blow cold on CMP alternately. Many believe it will be impossible to launch a full-fledged CMP before midyear; others think a modified CMP should be placed in effect as soon as possible.

MRO—A move is under way in NPA to establish a priority rating under which the manufacturers of products and services required for MRO (maintenance, repair and operation) of defense and essential civilian industries will be enabled to obtain the materials they need. So far these industries, by shopping diligently, have been able to get MRO requirements but the situation rapidly is getting more difficult as a result of the end-use limitations on aluminum, copper, tin and zinc. The MRO order should be out within three weeks.

Copper Price Holds—Economic Stabilization Agency, in a meeting with copper industry representatives, found that price of primary copper is relatively stable and received assurances that members of industry will not advance their prices without first notifying ESA. Administrator Valentine says no ceiling prices would be placed on copper at this time.

McManus: DPA Administrator

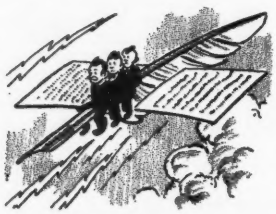
Clifford B. McManus, president of the Georgia Power Co. and the Southern Co., who went on leave from these posts Sept. 19 to assist Interior Secretary Oscar L. Chapman in the formation of the Defense Power Administration, was appointed DPA administrator.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Wilson Clears the Way

Happy About "Jebby"



Press Staff on Beam

A Law Business Will Like

TWO SETS of decisions of vital concern to business are in the making in Washington—one by Congress and the other by Defense Mobilizer Charles E. Wilson. From them will stem the coming controls over materials, prices and wages.

Mr. Wilson is overhauling the procurement organization and procedure in the armed services to get much faster action in placing contracts. In June, before we moved into Korea, military spending was at $12 billions a year. In December it was $18.5 billions a year. That, in Mr. Wilson's opinion, was not good enough. He wants contracts placed by negotiation whenever that will result in getting new production lines tooled up faster and in operation.

He has placed Gen. William Henry Harrison in charge of the newly-created Defense Production Administration. General Harrison's former position as chief of the National Production Authority will be filled later by Secretary of Commerce Sawyer. The DPA will direct NPA, defense transportation and several agencies of the Interior Department concerned with defense minerals and metals.

With the reshuffling of powers, virtually all materials essential to defense, except food, fall under General Harrison's office. The Department of Agriculture retains control of food, answering to Mr. Wilson.

General Harrison now has all the powers over priorities, allocations of materials, requisitioning, loans, purchasing and certification of accelerated tax amortization, previously vested in other agencies. With the revised lineup, the DPA will function in much the same way the War Production Board functioned during World War II.

'Jebby' Goes Back to Oregon . . .

Resignation of C. Girard Davidson —known as "Jebby"—as assistant interior secretary removes from the government one of the principal needlers of business. In 1946 and 1947 he spoke all over the country in condemnation of the iron and steel industry for being slow about expanding ingot capacity to the 110-million ton level which then was his goal.

When STEEL asked him if he was making due allowance for all the bottlenecks—in iron ore, lake carrier fleet, handling facilities, etc.—that would have to be remedied, he said yes, he realized all that, but he realized further that the whole program he had in mind represented a lot of work, employment and prosperity.

A likeable man, and normally a friendly one, Mr. Davidson is going back to his birthplace, Portland, Ore., to practice law—and possibly to spade the way for the next Democratic nomination for the Senate.

The President's Press Staff . . .

More emphasis on news of business significance should result from the reorganization of President Truman's press staff.

The new presidential press secretary, Joseph Short, former White House correspondent for the *Baltimore Sun*, chose as his principal aides two men familiar with business problems—Irving Perlmeter and Roger W. Tubby.

The former was information officer of the Bureau of Internal Revenue since 1943 and is thoroughly familiar with all policies coming under the head of taxation. Mr. Tubby is familiar with our foreign business interests: He served, as information officer for the old Foreign Economic Administration, the Office of International Trade and, since 1946, the State Department, for which he has attended all international conferences on reciprocal trade agreements.

An Allout Renegotiation Law . . .

Business opposition to enactment of a new allout renegotiation law is noteworthy by its absence. Washington business representatives will confine their efforts largely to perfecting the language of the bill in the interest of clarity. "Renegotiation has served a real purpose in relieving business of accusations of profiteering," one interested party told STEEL, "and all that we want is a good law." The Vinson bill, H. R. 9564, now before the Ways & Means Committee, would apply renegotiation to all military buying regardless of amount of money involved and whether contracts were placed by negotiation or advertising. It would apply also to procurement of the GSA, RFC and any other agencies designated by the President.

Renegotiation under the 1948 law is in full swing. Contractors and subcontractors should bear in mind that the law calls on them to take the initiative in such proceedings.

Contractors should also ascertain whether any of their business is subject to renegotiation. In identifying business that is subject to renegotiation they will be helped by studying the lists of such contracts and subcontracts available from the Superintendent of Documents, Government Printing Office, Washington 25, as supplements to the Military Renegotiation Regulations.

Hearings on Shortages . . .

First full-dress hearings of the new 82nd Congress will examine shortages of critical and strategic materials and ascertain what is being done to alleviate them. They will be held by the Senate's Small Business Committee—Sen. John Sparkman (Dem., Ala.), chairman—beginning Jan. 17.

Steel will be considered on Jan. 18, copper and zinc on Jan. 19 and aluminum on Jan. 22.

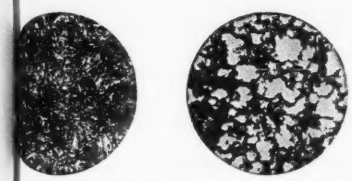
More Preprints Available . . .

Preprints of another chapter of the Bureau of Mines Minerals Yearbook for 1949 have been made available; it is entitled "Slag—Iron Blast Furnace" and is replete with statistics on production and end-use of blast furnace slag. Copies are obtainable at 5 cents from the Superintendent of Documents, Government Printing Office, Washington 25.

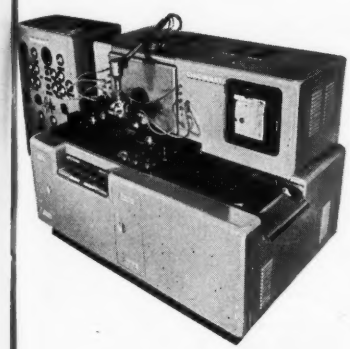
amatic hardening gives a lift to piston rod performance

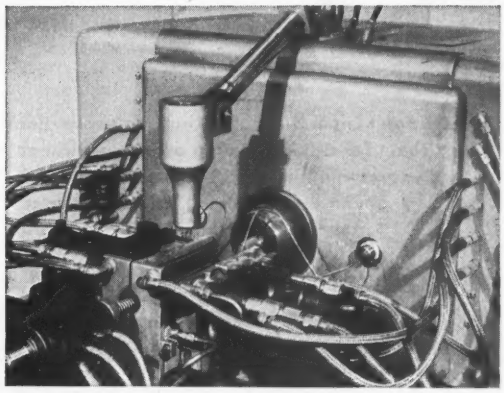
specified

gth: 14"
r: 1¼"
erial: SAE 1050
ture at surface: Rc 53-55



structure at transition zone: Rc 42





Close-up of hydraulic piston rod being Flamatic hardened, showing work centering device and special flame heads.

achieved

Flamatic selective surface hardening with electronic temperature control goes to great lengths to improve product performance, speed processing, and "shorten" costs as well. This slender 14" long hydraulic piston rod—formerly carburized—is now Flamatic hardened to Rc 53-55 in a matter of seconds . . . on a production line basis . . . and with distortion so slight that corrective operations are a thing of the past. Core and shaft ends are left soft.

A centering device and special flame head assembly readily adapts the standard Cincinnati No. 2 Flamatic to the job. Operati (automatic except for loading) is as straightforward and reliable as on gears, cams, etc., up to 18" OD and spindles up to 24" long.

Examine your present surface hardening processes in the light of a wide variety of Flamatic applications. Twelve interesting fully documented case histories are featured in the new 20-page Flamatic Catalog, Publication No. M-1724. Write for it, on your letterhead please.

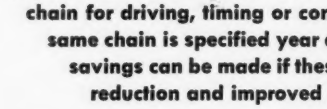
flamatic

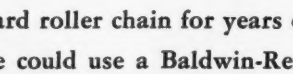
THE CINCINNATI MILLING MACHINE CO

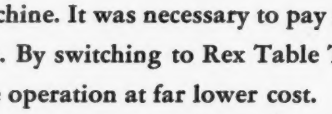
Cincinnati 9, Ohio, U.S.A. • CINCINNATI

Why take it for granted?

We don't know the reason, but somehow chains seem to be taken for granted. If a chain for driving, timing or conveying has operated reasonably efficiently, that same chain is specified year after year. Yet, case after case shows that important savings can be made if these important functions are viewed with an eye for cost reduction and improved performance. For example:

• A manufacturer has been using a standard roller chain for years on his machine. A Rex Field Sales Engineer showed him that he could use a Baldwin-Rex Double Pitch Roller Chain  and get the same operating efficiency at a substantial reduction in cost because speeds did not require standard roller chain.

• Another manufacturer had been using conventional flat top chain to carry cans through his machine. It was necessary to pay a premium for special bevel top plates to avoid tipping of cans. By switching to Rex Table Top®  he got even smoother tip-free operation at far lower cost.

• In another instance, a Rex Field Sales Engineer persuaded a manufacturer to switch from the pin-and-cotter roller chain he was using to a Baldwin-Rex Riveted Roller Chain.  The change not only resulted in an initial cost saving but in longer life since the rivets have greater holding power.

• To a manufacturer of construction machinery, who had been using cast manganese steel chains, a Rex Field Sales Engineer recommended the use of Rex Steel Chabelco Chains. Since these chains are designed for efficient operation under dusty, dirty conditions, longer service life for both chains and sprockets at lower overall costs resulted.

Because Rex Field Sales Engineers have all the resources of a complete chain line at their command, they can recommend without prejudice the exact type or size of chain that will deliver the most efficient performance at the lowest cost to you and your customers. You'll find it will pay you to consult with him regarding your chain application problems. Call your nearest Field Sales Office, or write to Chain Belt Company—1660 W. Bruce Street, Milwaukee 4, Wisconsin.

Chain Belt COMPANY OF MILWAUKEE

REX ® BALDWIN REX

REX CHAIN & TRANSMISSION DIVISION
Milwaukee 4, Wisconsin

BALDWIN-DUCKWORTH DIVISION
Springfield 2, Massachusetts

Evolution in ECA and Point Four

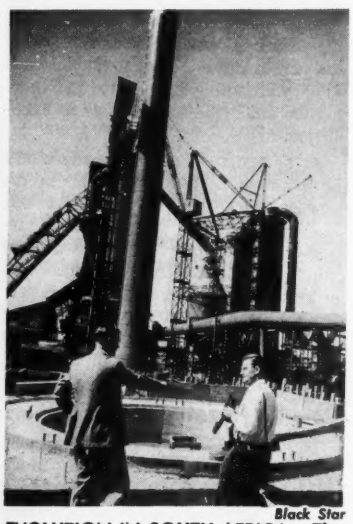
Point Four becomes a reality in Brazil. ECA shifts its emphasis to raw material development programs. A Marshall Plan for southeast Asia also shapes up

AN EVOLUTION in progress in America's ECA and Point Four programs is picking up speed as international events remain ominous.

Point Four is becoming a reality; Brazil will be the first South American country to spur its economic and industrial development under the plan. Not only is ECA pulling out of Britain, but it is shifting emphasis on the kind of projects it will still endorse in the countries where it yet has stakes. Raw material development programs are more apt to get approval now than at anytime since the Marshall Plan was proposed. ECA is also laying the groundwork for a bigger program in Southeast Asia.

Things To Come—Late last year ECA spent $30.3 million, primarily in establishing and setting up missions in Formosa, Thailand, Indonesia, Burma and the Indo-China states. In addition U. S. experts have gone to the Philippines to aid that country in meeting its initial commitments under the preliminary aid agreement signed in November. Another $4.5 million has gone to India to ease the famine.

The Southeast Asia area program was authorized June 5, 1950, and is just being implemented. In the next six months, Thailand is expected to get $8 million; Indonesia $13 million; Burma $8 to $10 million; Indo-China $21.4 million; and Formosa $40 million.



Black Star

EVOLUTION IN SOUTH AFRICA: The steelworks at Pretoria (Iscor) were built before World War I with German machinery. The foundation for another blast furnace is shown. The first (background) was blown in last summer . . .

Brazil Joins Point Four Fold

Brazil and the U. S. have agreed on technical co-operation under the Point Four program. A subsidiary agreement establishes a Joint Commission for Economic Development to assist Brazil in planning and carrying out an economic development program. It will be composed of a Brazilian and American commissioner and will be located in Rio de Janeiro. Its main job will be to study needs of Brazil and to recommend action.

Three subcommissions on transportation, power development and food and agriculture will advise and assist the commission. The U. S. has allocated $800,000 of Point Four funds to Brazil during the current fiscal year for new projects, of which about 60 per cent may be used for immediate studies on transportation and power.

The production of power is insufficient for Brazil's present needs. One problem is financing of proposed expansions. The power subcommission will study the possibilities of necessary foreign capital participation.

As part of the co-operation between the two countries, existing joint projects in Brazil will be expanded under the Point Four program. One of these is a geological survey by the U. S. Department of Interior. Since 1940 American geologists have been working with Brazilians surveying some of the nation's valuable mineral resources. Those investigations verify the existence of the two largest deposits of high-grade manganese known in the Western Hemisphere.

One of these, in the territory of Amapa, near the mouth of the Amazon, is estimated to contain at least 7 million tons of ore. The other, in the state of Mato Grosso, near the Bolivian border, contains an estimated 33 million tons of ore. Bethlehem Steel Co. is negotiating with Brazilian interests for the development of the manganese in Amapa and U. S. Steel is negotiating with other interests for developing the Morro do Urucum deposit in Mato Grosso.

American geologists are continuing to help to determine how much iron ore is in a mountain range at Itabira in the state of Minas Geraes. The deposit is believed to be one of the largest sources of high-grade iron ore in the world.

German Mine Gets ECA Help

One of Germany's largest lead and zinc ore producing areas, mined as early as the 13th century, will be further developed with the aid of Marshall Plan counterpart funds. ECA will advance the equivalent of $473,812 to Stolberger Zinc Mining & Smelting Corp. in Maubach to boost output of those strategic metals.

The firm will repay ECA in five years in shipments of lead and/or zinc to the U. S. stockpile. Deliveries will begin this year. The project will enable Germany to expand her lead exports to other Marshall Plan countries and will reduce her zinc imports from hard currency areas. Average grade of Maubach is 3 per cent lead and 2 per cent zinc.

The lead and zinc deposits total an estimated 28 million tons. Initially, the company will produce at the rate of 440 tons of ore per day, yielding more than 1600 tons of lead and 1100 tons of zinc per year.

Bethlehem Starts Ore Shipments

Bethlehem Steel Co. will begin ore shipments from Venezuela this month.

The company's development, handled through its subsidiary, Iron Mines Co. of Venezuela, involves a block of 16 iron ore concessions. Beth-

Black Star

. . . Ore for the South African steelworks is transported from the mines located in North Transvaal. Coal comes from Newcastle, England. Looking over things is a Negro bossboy. Behind him is the first blast furnace

lehem's investment in the project will ultimately total $50 million. An annual yield of about 2.5 million net tons of ore is expected eventually from the El Pao mines located about 30 miles south of San Felix, near the confluence of the Orinoco and Caroni rivers, about 165 miles from where the Orinoco empties into the Atlantic.

Initially, the open-pit method of mining will be employed. At the pit electric shovels of four-cubic-yard capacity will load the ore into 30-ton diesel engine trucks which will haul it to the crushing plant. The ore mined at El Pao mines will be shipped by rail to Palua, a port on the Orinoco near San Felix. A 36-mile railroad and an improved highway connect the mine and the port of Palua.

The ore will be loaded into river boats and barges from a conveyor belt which is supported on a steel cantilever structure overhanging the river. From the river site the ore will be taken to Puerto Hiero, the tidewater port on the Gulf of Paria, across from Trinidad. There it will be loaded into ocean-going ore carriers for shipment to the U. S.

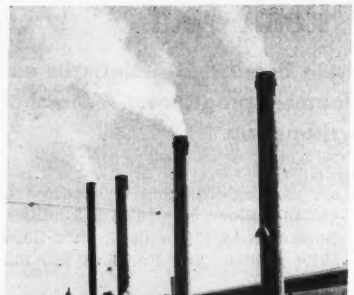
Salem, Brosius Merge

The combined organization will be known as Salem-Brosius Inc.

SALEM Engineering Co., Salem, O., and Edgar E. Brosius Co., Pittsburgh, are now one: The combined organization will be known as Salem-Brosius Inc. Both will continue to use their individual company identifications with no changes being made in the personnel. Ward A. Wickwire Sr., Brosius president, and Sam Keener, Salem president, divulged no details.

Design and manufacture of special machinery for the metal industries has been the forte of Brosius, founded in 1909. It also manufactures blast furnace accessories and materials handling equipment for blast furnaces and industrial heating and melting furnaces. World wide activities are conducted through licensees in most foreign countries.

Founded in 1934, Salem Engineering has a staff of design consultants and construction engineers specializing in industrial furnaces and steel mill equipment. Associated companies in Canada and England and licensees and representatives conduct its activities throughout the world. The associated companies are involved in the merger, which will make Brosius production facilities available for fabrication of equipment designed by both companies.



ONE DOWN, THREE TO GO: That's the score at Columbia Steel's Torrance, Calif., plant where the smog problem is rapidly being eliminated. By installing an electrostatic precipitator on the outlets of each of the open-hearth furnaces smog can be completely done away with. No smoke can be seen emanating from the second stack from the left. At its base is an electrostatic precipitator 60 feet high. Construction is underway on precipitators for the other stacks

The Skies Are Clearing Over L.A.

Air pollution in Los Angeles has been reduced 35 per cent since April, 1948, says Gordon P. Larson, county pollution control director. Since 1948 installation of smog abatement equipment totaling $3,924,500 has been made in Los Angeles industrial plants. Typical of the equipment being installed by Los Angeles steel producers is Columbia Steel Corp.'s $600,000 electrostatic precipitator, first of a total of four to be installed. The precipitator, 60 feet high, diverts exhaust gases from the open-hearths to a ventilated branch flue system leading to a cleaning system. The cleaned gas leaving the precipitator is 96 per cent cleaner than before entering the new air pollution equipment.

Opens LP Gas Facilities

Socony-Vacuum Oil Co., Inc. expects to open a new plant at South Norwalk, Conn., for filling and distributing liquefied petroleum gas. It will service dealers in Connecticut, Rhode Island, southern Massachusetts and southeastern New York, now being served by the company's refinery in Paulsboro, N. J. Building will have facilities for deicing, painting and filling the bottles. Gas will be delivered to the new plant by tank car.

Oil Gas Patent Granted

Gas Machinery Co., Cleveland, was granted a patent relating to the production of oil gas, using various types of process oil and with oil as fuel for heating. It is said to cover the basic process for the production of oil gas by present day methods.

The process differs from similar processes in the extent of cracking that takes place. Temperature and reaction time are such that the gas produced has a higher heating value. Known as the high Btu oil gas process, it uses equipment resembling that used for water gas production, although the process is entirely different. Processes coming within the scope of the patent have been installed and are being installed and licensed by the company under the patent, No. 2,522,922.

Delta Star Goes to Porter

H. K. Porter Co. Inc., Pittsburgh, acquired Delta Star Electric Co., Chicago, manufacturer of high voltage equipment for control and transmission of electricity around central power stations, and transformers. The addition of Delta and of Quaker Rubber Corp. and Connors Steel Co. gives Porter another line to add to its rubber, steel and oil field business.

Lockheed Sales Up 44 Per Cent

Lockheed Aircraft Corp., Burbank, Calif., is experiencing the largest sales volume since the war years. Robert E. Gross, Lockheed president, says the 1950 figure, expected to reach $170 million, will be 44 per cent higher than the 1949 total of $117,667,000.

A backlog of unfilled orders and government letters of intent is the largest since the end of World War II—$425 million. The backlog reported at this time last year was $230 million. Employment, too, has seen a gain, now being up 11 per cent from a year ago to 18,500. A peak of about 21,000 employees is expected to be reached at the end of this year.

Douglas Negotiates for Plant

Negotiations are in progress among Douglas Aircraft Co., Santa Monica, Calif., and the Air Force and Boeing Airplane Co., Seattle, Wash., for the use of a government airframe plant in Tulsa, Okla., to be used in the manufacture of B-47 bombers. An Air Force spokesman, in saying that details are being worked out, stated that it would be at least 18

months before Douglas could get into production on this plane.

This is the first time since the end of World War II that any Boeing-designed planes have been produced by a company other than the designer. The Tulsa plant was used during World War II by Douglas.

Pullman Enters New Field

By purchasing the tractor accessories operations of Isaacson Iron Works, Seattle, Wash., Pullman-Standard Car Mfg. Co., Chicago, enters the tractor allied equipment field. Champ Carry, Pullman president says Isaacson's Seattle operations will be transferred to the Hammond, Ind., plant of the company. The newly acquired company also maintained a plant in Rockford, Ill. Bulldozers, scrapers, rippers, hydraulic power units, winches and other equipment used mainly in the earth moving field were made by Isaacson. The company does not make tractors.

Synthetic Rubber Plant Reopens

Goodyear Tire & Rubber Co., Akron, O., will reactivate a government-owned synthetic rubber plant. It will increase the nation's supply of the critical material by some 55 million pounds in 1951. The company has 18 of the plant's 34 polymerizers in production and will follow with the remainder in February. First month's output should approximate 200,000 pounds. It was ordered reactivated in September by the Office of Rubber Reserve and will be operated by the Goodyear Synthetic Rubber Corp. It was necessary to replace considerable equipment which had been disposed of through the War Assets Administration following the government decision to cease operations in 1947. A changeover from dry rubber originally produced to latex, or liquid rubber, was also required.

8 Per Cent Defense at Koppers

With only 8 per cent of its present backlog of orders attributable to direct orders for military goods, Koppers Co. Inc., Pittsburgh, is entering 1951 with facilities geared to produce at high levels, not only for civilian needs but for whatever work of a national defense nature it is called upon to perform. So says Gen. Brehon Somervell, Koppers' president.

In 1950 the Engineering and Construction Division of the company completed and placed in operation nine coke batteries, comprising 448 ovens in the United States and one battery of 57 ovens in Chile. The domestic ovens alone are capable of producing enough coke to make nearly 3.5 million tons of pig iron.

Firm Awarded Half Billion Job

When F. H. McGraw & Co., Hartford, Conn., starts construction of a gaseous diffusion plant for the Atomic Energy Commission at Paducah, Ky., it will be beginning a $500 million job. The plant is to be built on a 6000 acre site and will produce U-235 for weapons and power plants.

To Build Small Motor Plant

Union City, Ind., will be the site of a Westinghouse Electric Corp. plant for the production of small electric motors. To be a modern one-story structure containing both manufacturing and office space, the new facility is expected to employ about 500 men and women when operations commence late in 1951.

Increased demand for fractional horsepower motors arising from defense program and increased building of industrial plants is making necessary the production of additional numbers of this type of motor, the company states. Plans for expansion of the company's Small Motor Division in Lima, O., call for leasing of two buildings, totaling 120,000 sq ft of floor space. These structures will be devoted to production of machined parts for the Lima plant and to office and storage use.

Mg Plants Reactivated

Government-owned magnesium plants held in the National Industrial Reserve are being reactivated, says Jess Larson, administrator of general services. The three plants which will make about 112 million pounds of magnesium available for stockpiling during the next 2 years are to be operated by: Diamond Magnesium Corp. at Painesville, O.; and two plants by Nelco Metals Inc., at Adams, Mass., and Wingdale, N. Y.

Rheem Steel Plant Purchased

National Radiator Co., Johnstown, Pa., has completed arrangements to purchase the Danville, Pa., steel plant of Rheem Mfg. Co., says the General Services Administration. National will take over the plant from Webrib Steel Co., Danville, this company having purchased the plant in 1947 from the War Assets Administration.

Natco Story: 50 Years of Drilling

SOMEWHERE between the bicycle and automobile ages were the beginnings of multiple spindle drilling. The earliest attempts at this form of drilling and tapping were made possible by a cash register, a side plate of a 1901 model being drilled and tapped by the first multiple spindle hex driller and tapper. In that year, six men from the National Cash Register Co., Dayton, O., developed a new type of drilling machine with several spindles; they formed a new company that this year is celebrating its 50th anniversary — National Automatic Tool Co. Inc. First located in the third floor of a downtown Dayton building, the company occupied 3500 sq ft of floor space. To ship a machine, it was necessary to remove an entire window frame from the side of the building to lower it to a big freight wagon below.

In 1910 the plant moved to larger quarters in Richmond, Ind., its present location. In succeeding years the company introduced independent change of speed for each spindle, slip spindle plates, the rotating table, multiple tapping with individual lead screws to each tap and hydraulic feed to its machines.

President of Natco is Harry Bockhoff, who succeeded his father in 1928. The company added floor space in 1943 and is now completing new building that will provide for engineering and welding expansion. The entire plant will include 254,000 square feet of floor space. It's a far cry from the third floor factory of half a century ago.

ACCURACY FOR THE PAYOFF: This is one of the new machines that National Cash Register Co., Dayton, O., uses for machine drilling and step reaming of cash register key frames. Accuracy is to 0.001-inch

NEW! NORTON PRECISION BUSHING* Offers 3 Important Advantages

The new Norton-developed precision bushing is the latest step in the continuous Norton program to give you better grinding wheels—an important step in which was the opening of the new Norton grinding wheel plant two years ago.

1. IMPROVES WHEEL BALANCE

You get new standards of balance in *every* wheel produced in the new Norton plant. And the precision construction of this aluminum bushing preserves for you every bit of the improved balance molded into the wheel—thus bringing to you *all* the improved performance that comes from better wheel balance.

2. HAS MORE UNIFORM HOLE SIZE

This new Norton bushing gives you precision arbor fits because precision manufacture holds its hole size to closer tolerances than ever before achieved in any other grinding wheel bushing.

3. STRENGTHENS HOLDING POWER

The fluted construction on the outside of each Norton precision bushing *plus* the method of press-fitting it into the wheel give you double assurance of a firm grip, even in fine grit wheels.

AVAILABILITY—The new Norton precision bushing is now being used in straight wheels 5" to 8" diameter. Its use will be extended to other wheel shapes and sizes as rapidly as possible. Keep in touch with your Norton distributor for the latest news.

*PATENTED—ANOTHER EXCLUSIVE NORTON FEATURE

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASS.

Warehouses in Five Cities — Plants in Six Countries
Distributors in All Principal Cities

NORTON
ABRASIVES

By H. C. TUTTLE *Detroit Editor, STEEL*

Mirrors of Motordom

GM is showing the public a new futuristic car, Le Sabre, which may give hints of what the automobile years hence will look like. It has a gasoline-alcohol fuel system

DETROIT

THE DREAMERS in the auto industry are giving reality to some of their visions. GM has just come out with a futuristic car, "Le Sabre."

Don't discount the vehicle as wildly impractical for in 1938 Buick built GM's first advance car. It had features now common in many models. Buick's "Y job" was the first American-styled car on public display with electrically controlled convertible top and door windows, pushbutton door latches inside and out, fender extensions into the doors, tail lamps recessed in the rear fenders and a lower vertical grille.

Evolution to Metal—Le Sabre, better known around GM shops and labs as XP8, is a sports two-seater. It's now only a full-sized plaster model, but it will be built in metal in the next two months.

Le Sabre will be powered by an experimental V-8 engine with 10-to-1 compression ratio plus supercharger. Dual fuel system will use premium gasoline and methyl alcohol, the latter being injected into the combustion chambers through the carburetor for extra power boosts. This engine, now being tested by Buick, is expected to develop more than 300 horsepower with supercharger. Stroke and bore are 3¼ by 3¼ inches. Piston displacement is 215 cubic inches.

Nonferrous Uses—Head and cylinder block are of cast aluminum alloy. Cylinder walls are lined with a special heat resistant cast iron and the combustion chambers in the head are machined, not cast. The head also has stainless steel valve seat inserts. Flywheel is of high tensile bronze. Valve guides also are of bronze. Intake valves are made of nickel chrome alloy steel and the exhaust valves are sodium cooled. Pistons are made of aluminum alloy.

Weight of the engine is 500 pounds, compared to 750 pounds for the Buick Roadmaster engine. Total weight of the car will be about 3000 pounds, the lightness resulting from wide use of heat-treated magnesium and aluminum alloys in the body and engine.

Novel Arrangements—A special dynaflow torque converter is housed just ahead of the differential. Rear brakes are not on the wheels, but on either side of the differential. Axles mount twin universal joints. Because Le Sabre's wheels are below conventional size, brake drum diameter is limited to nine inches. In compensation, the brake drums are of twin-shoe type to provide necessary braking surface.

A special anti-dive feature is built into the independent front suspension, and the rear wheels are also independently suspended, with the differential stationary.

The body, presenting lines similar to a jet plane, is 36¼ inches high at the cowl, 50 inches with top raised. Low profile notwithstanding, road clearance of six inches is provided. Wheelbase is 115 inches and overall length 200 inches. Overall width is 76½ inches.

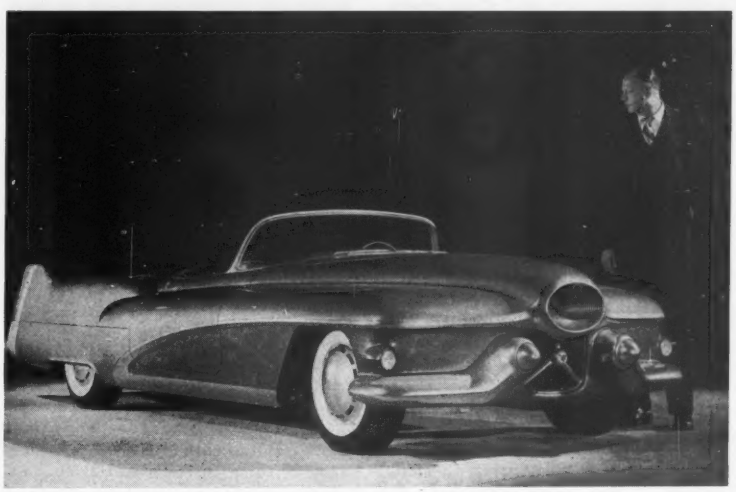
Style Shifts—Among the styling features are twin tail fins each of which houses a 2-gallon rubberized fuel cell, one for gas, the other for methyl alcohol. The jet-type tail cone has functional use, although not that of the planes after which it was patterned. Stoplight is housed in it and the spinner hub serves as rear bumper. Tail lights, directional signals and backup lights are mounted vertically on the trailing edge of the tail fins.

The grille-like "intake scoop" at the nose is a fooler. It revolves to disclose a pair of close set headlights. Fixed running lights are at the outer extremity of the front fenders.

Below the headlight assembly is the radiator air intake. The aluminum radiator core is protected by an inverted Y bar, lines of which are picked up by the massive bumper which mounts bulletnosed spinners.

More Air—To provide ventilation for the rear brakes and for a supplemental 12-volt battery powering Le Sabre's many electrical devices, air scoops are located at the curve of the rear fenders.

The cockpit is a gadgeteer's delight. In addition to the usual gages, such things as tachometer, compass and altimeter are built in. A useful feature should be the built-in torque converter, fluid level and temperature gage. Controlled from the instrument panel are built-in hydraulic jacks for each wheel. All doors and windows are electrically controlled, but also function mechanically in case of battery failure—heaven forbid. In addition to a warm air circulating system the seats are electrically heated. The electrically operated convertible top has at least one thoroughly desirable feature . . . it raises when



THOSE SWEEPING LINES: Harley J. Earl, General Motors vice president in charge of styling, looks over the full-scale model of Le Sabre, a custom-built sports car that will be a laboratory on wheels for testing advanced design and mechanical features when completed. In development for the last four years, Le Sabre utilizes lightweight aluminum and magnesium alloys in its body and engine construction and incorporates the lines of a jet

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

rain hits a sensitized spot between the seats.

Not Practical—General Motors' vice president in charge of styling, Harley J. Earl, makes no predictions as to what features of the car may sometime appear in production models. The front bumper line already bears similarity to the new Cadillac, and the flossy side trim looks like a continuation of the Buick sweep spear. Mr. Earl points out that many of the materials used in Le Sabre make it completely "untouchable" from a cost standpoint for production cars. But "if the time comes when some materials or some devices . . . get within range of the customer's pocketbook, we'll be ready."

New Kaiser Introduced

A somewhat less fanciful car has been placed in production by Kaiser-Frazer. The custom-styled Kaiser, tagged the "Golden Dragon" series, appears first as a four-door sedan, but will be offered later in two-door and club coupe models. The name comes from the brilliant body color combinations and the use of alligator-patterned vinyl upholstery. This leather-like material is used in the padded dash panel, seats, door panels and rear window shelf. Solid color vinyl plastic is used for headlining, scuff panels and other trim. Interior colors are scarlet, Caribbean coral, tropical green, black, Indian ceramic and Burma brown. Two-tone body paint combinations feature Cape Verde green, Indian ceramic, Caribbean coral, mineral gray, garden green, marine gray and aloha green. The new series is being assembled at Jackson, Mich., Long Beach, Calif., and Willow Run.

Vendors Hard Hit by Prices

Vendors to the industry indirectly got just as hard a punch in the nose by ESA's initial price regulation as did the auto companies, although the hullabaloo about it has been much less public.

Virtually every part and material the industry needs to build cars is costing more to produce than it did a few months ago. Labor cost is up at most plants or soon will be. Some parts suppliers who advanced prices on Dec. 1 believe they need another increase now, but their Detroit representatives are burning up the long distance wires telling the home offices the industry won't stand for it.

More Money for Suggestions

Inflation Note—$2500 is now the top award under the General Motors employee suggestion plan. Minimum award is upped from $7.50 to $10. The top figure, payable in U. S. Savings Bonds, had previously been $1000. In the nine-year operation of the system 728 top awards have been made. In all $5,740,000 has been paid out.

Auto Truck Output

U. S. and Canada

	1950	1949
January	609,882	445,092
February	505,593	443,734
March	610,678	543,711
April	585,705	569,728
May	732,161	508,101
June	897,856	623,689
July	746,771	604,351
August	842,304	678,092
September	760,808	657,073
October	795,918	601,021
November	633,678*	475,454
December	650,000*	384,318

Weekly Estimates

Week Ended	1950	1949
Dec. 9	162,757	52,514
Dec. 16	169,480	86,226
Dec. 23	160,912	116,567
Dec. 30	130,200	113,026
Jan. 6	120,000	116,768

Estimates by Ward's Automotive Reports

* Preliminary.

How Many Cars in 1951?

While the industry's publicity men were grinding out declamations on the herculean task their respective companies performed in 1950, another group of writers sat down to have lunch and to play a guessing game. The Automobile Manufacturers Association at yearend gets automotive and technical writers together on the promise that the best predicter of the following year's car and truck production will get a new hat at the next annual get-together. Presumably if a guesser comes close, he needs a new hat to fit his swollen head. The guestimates ranged from a high of 5.8 million cars and 1.6 million trucks, to a low of two million cars, 450,000 trucks. By throwing out several of the top and bottom guesses in accordance with the best devious logic of statisticians, AMA told the newsmen-turned-crystal-ball-gazers their collective belief is that 3,395,000 cars and 908,000 non-military trucks and busses will be produced in 1951.

One man who might be expected to have ideas on 1951 output is Joseph E. Bayne, Lincoln-Mercury general sales manager. Speaking to a group of Cincinnati dealers recently, he said that a prediction even within a million units for the year's automobile production "is impossible." He said that most manufacturers would hesitate to say which materials shortage might have the greatest effect. Steel being vital, that material was discussed first. In January, he said, it has been estimated car production schedules may be 25-30 per cent lower because of steel shortages. Shortages also loom in most of the remaining 30 auto components.

Studebaker Cuts Back

One automotive casualty from the restrictions on civilian use of critical materials is Studebaker Corp. A 20 per cent reduction in passenger car output has been scheduled this month. The South Bend facility went on a four-day week for cars. Civilian truck production cutbacks were largely offset by military truck output. Five Buick-Oldsmobile-Pontiac assembly division plants across the country also ran into a "sudden acute shortage of materials" and were forced to close down. Full-scale operations, however, resume today. Packard began a 20 per cent cutback in production as the year started, laying off about 1800 workers. Nash is laying off about 4500 employees, curtailing output of cars and appliances about 25 per cent. Night shift was "premanently abolished" at the Lincoln-Mercury Metuchen, N. J., plant and 1000 workers were laid off.

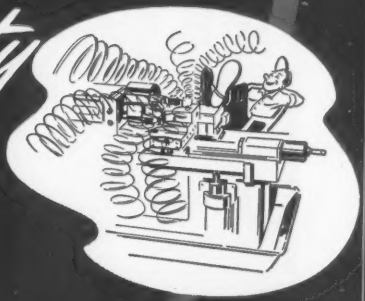
Now Chrysler, too, is planning cutbacks. In coming into new model production the company's production schedule is going to be reduced about 20 per cent under its previous level.

War Orders Start

The war orders are starting to come. Cadillac received an additional $57 million contract for its Cleveland tank building program. The Kansas City, Kans., B-O-P assembly plant of GM will be used in building an undisclosed number of F-84 Republic Thunderjet fighters. Oldsmobile will produce 3.5 inch super-bazooka rockets in its engine parts plant at Lansing, Mich. This plant had formerly housed manufacture of the now discontinued Olds six-cylinder engine. GMC Truck & Coach Division, Pontiac, received a $100 million letter contract for military vehicles. Fruehauf Trailer Co. will build 35,000 all-purpose military cargo trailers at its Avon Lake, O., facilities. The largest single order for military jeeps was received by Willys-Overland—$63 million, topping by $16 million the largest previous order placed in 1944. Chrysler Corp. got a $160 million contract for medium tank production at a plant to be built in Newark, Del.

Extra Toughness

Better Machinability



· LATROBE ·

DESEGATIZED BRAND*

HIGH SPEED STEELS

HI CARBON - HI CHROME DIE STEELS

Fewer Heat Treat Losses

The full structural uniformity of Latrobe's Desegatized Brand High Speed Steels and Hi Carbon—Hi Chrome Die Steels is a valuable aid to tool and die fabricators and users alike.

The evenly dispersed carbide particles in Desegatized Brand steels result in longer tool and die life . . . extra strength and toughness . . . smoother, more accurate machine finishes . . . advantageous response to heat treatment with cracks, checks and warpage radically minimized . . . plus superior grinding abilities.

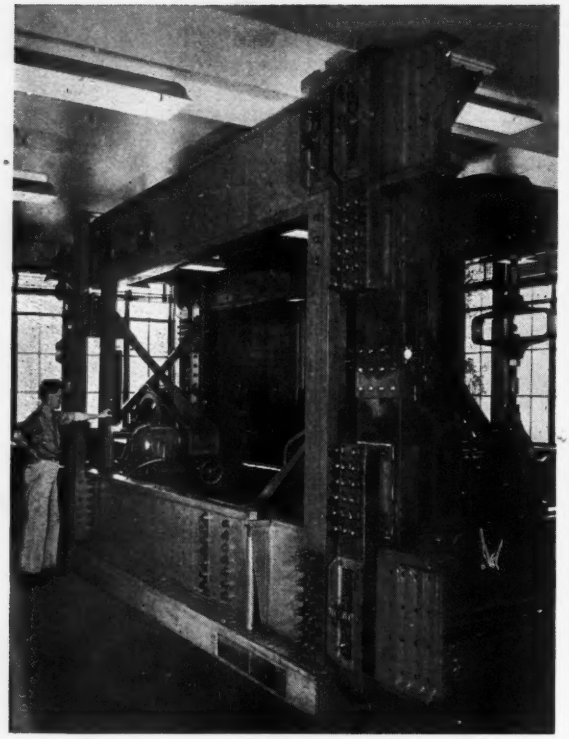
Write or call your nearest Latrobe Sales Engineer for complete facts on Latrobe's Desegatized Brand Steels!

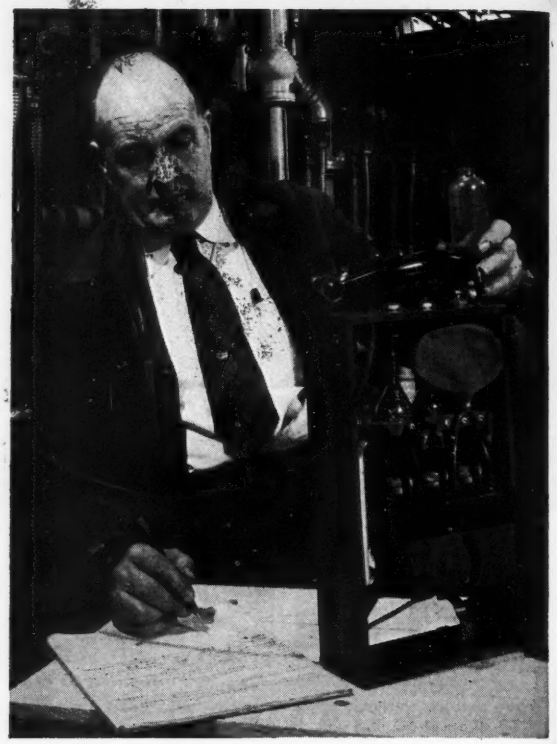
LATROBE ELECTRIC STEEL COMPANY

LATROBE, PENNSYLVANIA

Branch Offices and Warehouses located in principal cities.

*Trade Mark Registered U. S. Pat. Office.





BETTER JOINTS . . . for Making Better Buildings

Superior fatigue strengths and smaller slippages are obtained in structural joints fastened with high-carbon bolts . . . according to the fatigue tests shown above.

These tests have been conducted by the Northwestern Technological Institute under the auspices of the Industrial Fasteners Institute.

The results of tests such as these indicate the advantages of using bolts in structural connections. To keep up-to-date with this important trend in construction, write RB&W for a copy of the report entitled, "The Effect of Various Fasteners on the Fatigue Strength of a Structural Joint".

Jack Allan is checking the atmosphere in one of RB&W's modern heat-treating furnaces. It is a process which insures the greatest control of strength and toughness for fastening jobs where high stresses will be encountered.

In this furnace a chemically controlled atmosphere continuously bathes the work, preventing the formation of objectionable scale. Equally important, it prevents any loss of carbon from the fastener surface during heat treatment.

Thus Jack, along with hundreds of other RB&W craftsmen (many of them second and third generation in the company), helps to develop the desired combination of properties demanded for various types of building jobs.

RB&W

The Complete Quality Line

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Oakland. Sales agents at: Portland, Seattle. Distributors from coast to coast.

105 Years Making Strong the Things That Make America Strong

The Business Trend

Will general price controls be enough to stem inflation? Federal economists are alarmed at rising individual and corporate spending

GOVERNMENT economists are more alarmed than they admit publicly at the rising inflationary tides. They have fists plugged in the price dike holes, but they fear other economic walls will give away so fast that the whole situation will get out of hand.

A number of indicators warn of danger ahead. One of the clearest is this: Liquid savings by individuals amounted to less than one-fifth of 1 per cent of income after taxes in the third quarter of 1950, a new low. That compares with an annual rate of over 2 per cent in 1949 and about 6 per cent before the war. In the third quarter, individuals saved on balance only an estimated $100 million in liquid form, compared with $1.4 billion in the same 1949 period. Liquid savings in the fourth 1950 quarter are expected to fall still lower.

Mortgage debt of individuals increased $1.8 billion in the third period of 1950, another record rate. Other consumer debt also showed a substantial gain, $1.7 billion. So, people are not only putting as much of the money they have now into things, but they are promising to put an increasing proportion of their cash into materials in the future, too. That spurs inflation in two ways: It bids prices up, and it means less confidence in the currency.

Indications are that corporate reactions are the same as individual. Manufacturers' inventories rose from $31.6 billion in October to $32.7 billion in November. The $1.1 billion increase was partly accounted for by higher prices, but most of the gain came from greater physical volume of goods. Industry is spending its money at an unprecedented rate in construction, also. In the week ended Dec. 21, heavy construction awards hit $692 billion, an alltime peak. At the yearend, engineering construction stood at $12.4 billion, a 51 per cent hike over 1949. Some $5.7 billion of that was for public building and $6.7 billion for private.

In the week ended Dec. 30, STEEL's industrial production index slipped to a preliminary 201 per cent of the 1936-1939 average. The holidays and natural gas curtailments because of the cold weather caused the decline.

Steel, Autos Hold Pace . . .

The two Mr. Bigs in metalworking, steel and automobile industries, continue to produce at record rates.

Steel mills are turning out ingots in excess of 100 per cent of theoretical capacity. Auto assembly plants are beginning to be nicked by materials shortages and model changeovers, but the industry's production outlook for the first quarter of 1951 is encouraging. Barring unexpected setbacks, nearly 2 million cars and trucks may be completed in the U. S. during January, February and March. That would compare with 1,645,879 in the first quarter of 1950 when production was held down by the Chrysler strike.

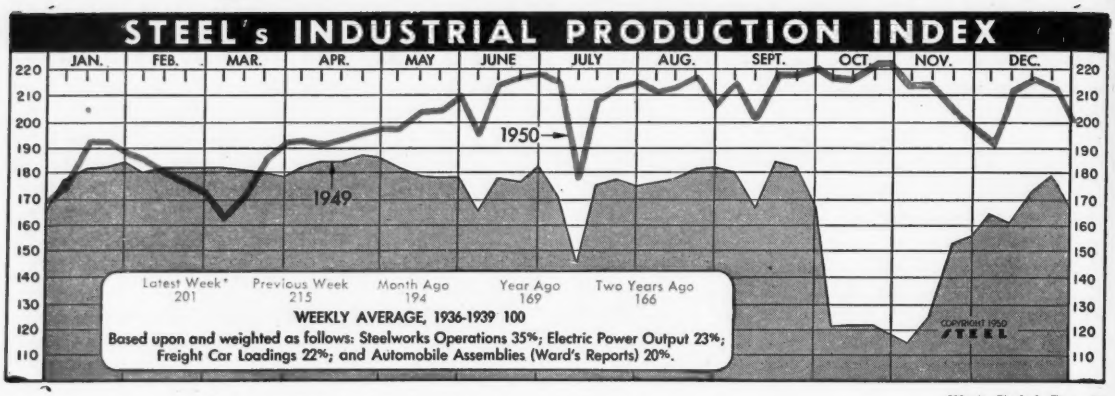
January production will be affected 20 per cent production cutbacks by Packard and Studebaker, slow assembly of new 1951 models by Chrysler and inauguration of 1951 model production by Buick and Oldsmobile.

Durable Goods Sales Soar . . .

Durable goods sales reached $10 billion in November, 3 per cent over

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	98.0	101.5	81.5	94.5
	Electric Power Distributed (million kilowatt hours)	7,000	7,033	6,716	5,493
	Bituminous Coal Production (daily av.—1000 tons)	1,825	2,001	1,508	1,565
	Petroleum Production (daily av.—1000 bbl.)	5,750	5,763	5,825	4,996
	Construction Volume (ENR—Unit $1,000,000)	$111.2	$692.0	$260.3	$66.9
	Automobile and Truck Output (Ward's—number units)	130,200	160,912	152,107	113,026
	* Dates on request. † 1950 weekly capacity is 1,928,781 net tons. 1949 weekly capacity was 1,843,516 net tons.				
TRADE	Freight Car Loadings (unit—1000 cars)	680†	747	740	496
	Business Failures (Dun & Bradstreet, number)	150	174	160	109
	Money in Circulation (in millions of dollars)‡	$27,916	$27,929	$27,543	$27,765
	Department Store Sales (changes from like wk. a yr. ago)‡	+17%	+9%	−3%	−14%
	† Preliminary. ‡ Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$14,495	$18,247	$13,009	$11,844
	Federal Gross Debt (billions)	$256.7	$256.7	$257.0	$257.0
	Bond Volume, NYSE (millions)	$22.8	$32.6	$21.0	$20.5
	Stocks Sales, NYSE (thousands of shares)	14,128	17,372	12,212	7,977
	Loans and Investments (billions)†	$71.4	$70.3	$69.7	$67.4
	United States Gov't Obligations Held (millions)†	$33,810	$33,439	$33,306	$37,657
	† Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	167.67	167.67	157.76	156.83
	STEEL's Nonferrous Metal Price Index‡	246.9	*246.9	240.7	161.6
	All Commodities†	176.0	174.7	171.7	151.2
	Metals and Metal Products†	184.1	184.3	180.6	168.3
	† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100. †† 1935-1939=100.				


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
220 210 200 190 180 170 160 150 140 130 120 110
1950
1949
Latest Week* 201
Previous Week 215
Month Ago 194
Year Ago 169
Two Years Ago 166
WEEKLY AVERAGE, 1936-1939 100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
COPYRIGHT 1950 STEEL

Week Ended Dec. 30

the previous month on a seasonally adjusted basis and 50 per cent larger than a year ago, Commerce Department reports. The largest increases occurred in nonferrous and transportation equipment other than motor vehicles. The advance in durable sales was offset by a decline in nondurable sales, off 2 per cent from October.

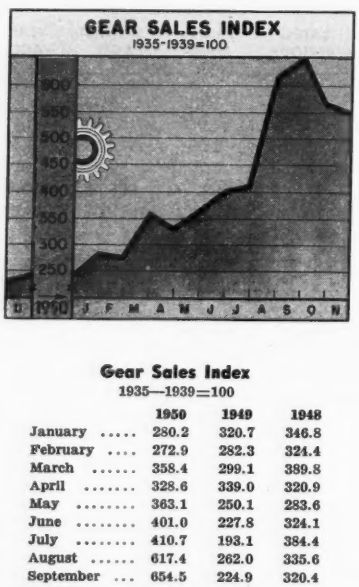
New orders placed with manufacturers during November were somewhat below October, the decrease being largely seasonal. For the durables, the decline was about 10 per cent. New business of nondurable-goods industries was down about 5 per cent. Unfilled orders in both the durable and nondurable groups increased. The rise in durable backlogs amounted to $1 billion and was distributed among all component industries except nonferrous metals.

Sales, Profits Hit High . . .

Sales and profits for U. S. manufacturing corporations set new records in the third quarter of 1950, according to the Federal Trade Commission and Securities & Exchange Commission. Sales increased 12 per cent over the previous high in the second quarter and amounted to $48.6 billion. Profits after taxes in the third quarter totaled $3.7 billion, an increase of 16 per cent over the second quarter.

Carloadings To Climb . . .

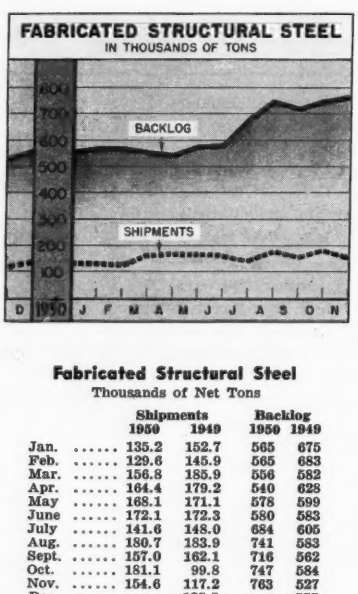
Freight carloadings in the first quarter of 1951 may be 16.5 per cent above those in the same 1950 period, according to estimates compiled by the 13 Regional Shippers Advisory Boards. Freight carloadings of the 32 principal commodity groups will be 6.9 million cars in the first quarter of 1951, compared with 5,947,451 actual carloadings for the same commodities in the like period of 1950.



Gear Sales Index
1935—1939=100

	1950	1949	1948
January	280.2	320.7	346.8
February	272.9	282.3	324.4
March	358.4	299.1	389.8
April	328.6	339.0	320.9
May	363.1	250.1	283.6
June	401.0	227.8	324.1
July	410.7	193.1	384.4
August	617.4	262.0	335.6
September	654.5	224.9	320.4
October	564.8	242.3	333.3
November	554.9	230.7	309.0
December		242.8	325.9

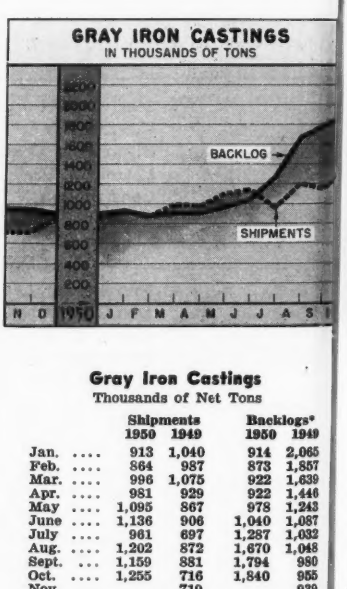
American Gear Mfrs. Association



Fabricated Structural Steel
Thousands of Net Tons

	Shipments 1950	Shipments 1949	Backlog 1950	Backlog 1949
Jan.	135.2	152.7	565	675
Feb.	129.6	145.9	565	683
Mar.	156.8	185.9	556	582
Apr.	164.4	179.2	540	628
May	168.1	171.1	578	599
June	172.1	172.3	580	583
July	141.6	148.0	684	605
Aug.	180.7	183.9	741	563
Sept.	157.0	162.1	716	562
Oct.	181.1	99.8	747	584
Nov.	154.6	117.2	763	527
Dec.		135.5		555
Total	1,853.5			

American Institute of Steel Construction



Gray Iron Castings
Thousands of Net Tons

	Shipments 1950	Shipments 1949	Backlogs* 1950	Backlogs* 1949
Jan.	913	1,040	914	2,065
Feb.	864	987	873	1,857
Mar.	996	1,075	922	1,639
Apr.	981	929	922	1,446
May	1,095	867	978	1,243
June	1,136	906	1,040	1,087
July	961	697	1,287	1,032
Aug.	1,202	872	1,670	1,048
Sept.	1,159	881	1,794	980
Oct.	1,255	716	1,840	955
Nov.		719		939
Dec.		862		892
Total	10,551			

* For sale. Bureau of the Census

Radio, TV Sales at Peak . . .

Close to 7.5 million television receivers and more than 14 million radios were manufactured in 1950 for an alltime record, says Robert C. Sprague, president of Radio-Television Manufacturers Association.

Manufacturers' sales amounted to about $1.7 billion in 1950, a 90 per cent increase over 1949 sales and 125 per cent more than in 1948. At the peak of the fall boom, the industry was producing television receivers at an annual rate of better than 10 million sets and radios at the rate of 17 million units.

Credit Man Sees Bleak Outlook...

In 1951 business will increase its activity, but civilian output will be more restricted, says Henry H. Heimann, executive manager of the National Association of Credit Men.

Labor will be in short supply. Wages, despite all efforts to control inflation, will rise in dollars. The buying power of the dollar may deteriorate further. Business earnings have passed their peak. Interest rates will rise, though not sharply.

Mr. Heimann advises: Don't speculate in inventories; keep your equipment up to the minute; anticipate increased taxes; maintain strong sales and credit departments; develop better credit worthiness with your marginal customers.

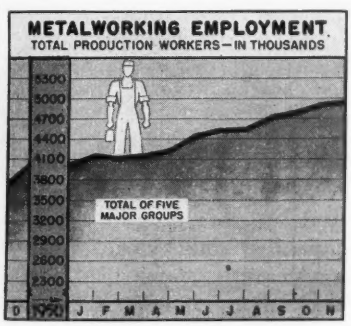
Civilian Pinch by March

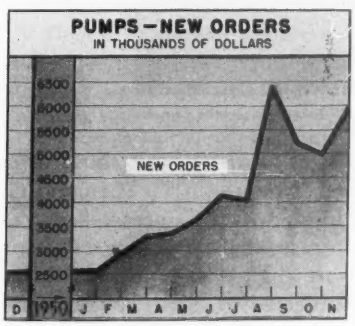
The real pinch in civilian goods will not be felt until next March, National Association of Purchasing Agents estimates. The group's business survey for December declares that a fairly high output of finished goods should continue to roll out as in-process inventories are used up.

The report expressed doubt that accelerated defense orders can be put into production in time to take up the anticipated slack in March and the early part of the second quarter. Industrial inventories are generally out of balance. The survey shows that raw material stores are probably below a practical working inventory.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Construction Dec.25	Ironers Dec.18	Steel Forgings Nov.20
Durable Goods Nov.27	Machine Tools Nov.27	Steel Shipments ...Dec.25
Employ., Steel Dec.25	Malleable Cast. Dec.18	Vacuum Cleaners...Dec.4
Foundry Equip. Dec.18	Price Indexes Dec.11	Steel Castings Nov.20
Freight Cars Dec.18	Purchasing Power .Dec.11	Wages, Metalwkg...Nov.27
Furnaces, Indus. ...Dec.18	Radio, TV Aug.14	Washers Dec.11
Furnaces, W. Air ..Dec.25	Range, Elec. Dec.4	Water Heaters Dec.25
Indus. Produc. Dec.11	Ranges, Gas Dec.4	





Metalworking Employment
Production Workers—Five Major Groups

1949	Prim. Mtls.	Fab. Prod.	Mach. inery	Elec. Mchy.	Trans Equip.
Nov.	737	666	908	546	898
Dec.	955	988	929	558	896
1950					
Jan.	963	693	936	561	978
Feb.	977	699	959	572	872
Mar.	982	709	981	580	879
Apr.	1,007	722	1,003	595	899
May	1,025	742	1,022	605	1,046
June	1,051	769	1,034	615	1,078
July	1,053	773	1,031	620	1,070
Aug	1,086	814	1,060	655	1,118
Sept.	1,104	837	1,056	677	1,132
Oct.	1,116	850	1,111	708	1,151
Nov.	1,124	847	1,130	721	1,135

Bureau of Labor Statistics

Pumps, New Orders
In Thousands of Dollars

	1950	1949	1948
Jan.	2,586	3,390	3,819
Feb.	2,938	3,247	3,635
Mar.	3,313	3,593	4,703
Apr.	3,376	2,699	4,312
May	3.668	2,775	3,724
June	4,153	3,019	3,512
July	4,080	3,358	4,075
Aug.	6,429	3,767	4,520
Sept.	5,191	2,914	3,474
Oct.	4,985	2,539	3,571
Nov.	5,961	5,525	3,580
Dec.	....	2,560	4,263
Total	....	36,386	47,188

Hydraulic Institute

Brass • Bronze
Stainless • Monel
Alloy Steels
BOLTS NUTS
STUDS
Here's a full line of bolts, nuts and studs in all types of metals. Accurately threaded to assure a uniform Class 3 Fit, Pawtucket products are made in standard dimensions or to your specifications.
BETTER BOLTS SINCE 1882
Use Headed and Threaded Fasteners for Economy and Reliability
PAWTUCKET
"THE BOLT MAN"
MANUFACTURING COMPANY
327 Pine Street · Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS
T.M. REG.

Better lubrication, lower maintenance costs for roll neck bearings —

Gulf XXX Lubricant

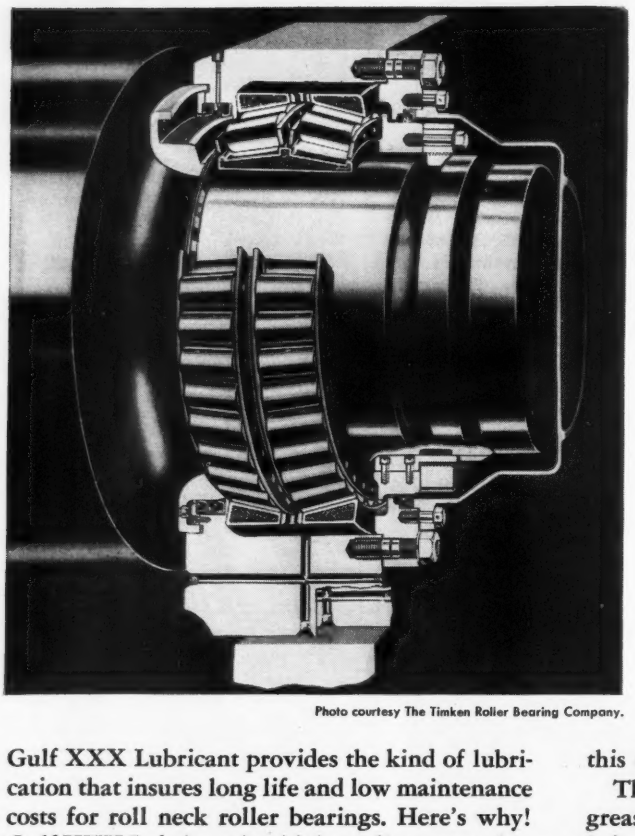


Photo courtesy The Timken Roller Bearing Company.

- **Exceptional extreme pressure characteristics**
- **High resistance to washout**
- **Effective protection against corrosion**
- **Good stability**
- **High pumpability**

Gulf XXX Lubricant provides the kind of lubrication that insures long life and low maintenance costs for roll neck roller bearings. Here's why! Gulf XXX Lubricant is a high quality grease that has exceptionally good extreme pressure characteristics—protects rollers and races subjected to shock loads or overloads. It provides that extra margin of protection so often required in rolling mill service.

Gulf XXX Lubricant stays put—is not washed out of the bearing, even when subjected to the washing action of large quantities of water. Thus bearings get continuous protection and grease consumption is kept to a minimum.

Another advantage of Gulf XXX Lubricant under wet conditions is its excellent rust-preventive characteristics — it covers every roller and raceway with a film that protects highly polished surfaces. You will eliminate bearing failures from this cause when Gulf XXX Lubricant is in use.

Then, too, Gulf XXX Lubricant is a very stable grease—won't separate in storage or in service. It has excellent pumpability and is ideal for centralized lubricating systems.

For further information on Gulf XXX Lubricant and other Gulf quality lubricants for steel mills, call in a Gulf Lubrication Engineer today. Write, wire, or phone your nearest Gulf office. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

Men of Industry

ALAN F. SHELDON
. . . president, Kennecott Wire & Cable

Alan F. Sheldon, formerly vice president and general manager, was elected president of **Kennecott Wire & Cable Co.,** Phillipsdale, R. I., a subsidiary of Kennecott Copper Corp. He succeeds **Robert L. Coe,** retired.

Robert C. Black was appointed advertising manager, machinery division, **Dravo Corp.,** Pittsburgh. He formerly was with Westinghouse Electric Corp.

N. W. Landis was named manager, Detroit district office, **Allis-Chalmers Mfg. Co.,** succeeding **F. S. Schuyler,** retired. Mr. Landis was manager, Syracuse, N. Y., office, and is succeeded by **A. J. Mestier Jr.**

William S. Lowe, executive vice president, **A. P. Green Fire Brick Co.,** Mexico, Mo., was elected president to succeed **Robert S. Green,** resigned. Mr. Green continues as a director.

ROY J. FOSTER
. . . sec'y and dir., Consolidated Iron-Steel

Roy J. Foster, manager of warehouse sales, Republic Structural Iron Works Division, **Consolidated Iron-Steel Mfg. Co.,** Cleveland, was appointed secretary and member of the board of directors of the parent company. In these positions he succeeds the late **R. A. Godfrey,** who was Consolidated's executive vice president and secretary. Mr. Foster has been with Consolidated Iron-Steel for over 28 years.

Arthur V. Wiebel, vice president in charge of operations, **Tennessee Coal, Iron & Railroad Co.,** Birmingham, subsidiary, U. S. Steel Corp., was elected president to succeed **Robert Gregg,** retired. **John Pugsley,** comptroller, was elected to the newly established position of executive vice president, and is succeeded by **Hartwell A. Greene,** formerly assistant comptroller. **J. M. Spearman,** manufacturing operations manager, becomes vice president-operations.

F. L. YETTER
. . . senior V. P., Wheeler Mfg.

F. L. Yetter was appointed senior vice president, **C. H. Wheeler Mfg. Co.,** Philadelphia. He rejoins the company after a 20-month period during which he served as director of foreign affairs for the Kuljian Corp. In 1946 he was elected vice president and assistant general manager of the Wheeler company, from which post he resigned in April, 1949.

Edward J. Hanley was elected president, and **Clark W. King,** executive vice president of **Allegheny Ludlum Steel Corp.,** Pittsburgh. Mr. Hanley succeeds **E. B. Cleborne,** resigned, but who continues as a director and vice president. **Frank B. Lounsberry** has retired as vice president and technical director, and **W. B. Pierce** becomes technical director. Mr. King succeeds Mr. Hanley and remains as treasurer.

W. E. Noyes, general sales manager of **Diversey Corp.,** Chicago, for the last four years, was named vice presi-

WILLIAM S. LOWE
. . . A. P. Green Fire Brick president

ARTHUR V. WIEBEL
. . . new president, TCI

W. E. NOYES
. . . Diversey vice president-sales

dent in charge of sales. He joined the company in 1935.

J. Oliver Black, formerly president, was elected chairman of the board of **Peninsular Metal Products Corp.,** Detroit. **Robert W. Burgess** is the new president. He was formerly vice president. **Roy T. Mitchell,** president, Banian Corp., was elected a director of Peninsular. The Banian Corp., Detroit, is now a sales representative of Peninsular Metal Products.

Capt. David R. Hull, USN, ret., was elected a vice president of **Raytheon Mfg. Co.,** Waltham, Mass. Captain Hull, formerly assistant manager of the equipment divisions, becomes manager to succeed **Wallace L. Gifford,** who continues with the company as a director and vice president in an advisory capacity.

Charles L. Hardy was elected president, **Joseph T. Ryerson & Son Inc.,** Chicago, to succeed **Everett D. Graff,** who becomes chairman of the executive committee. **Thomas Z. Hayward** was elected vice president in charge of sales.

Lorenzo Semple was elected vice president and treasurer, and **John W. Brennan** secretary, **United States Pipe & Foundry Co.,** Burlington, N. J.

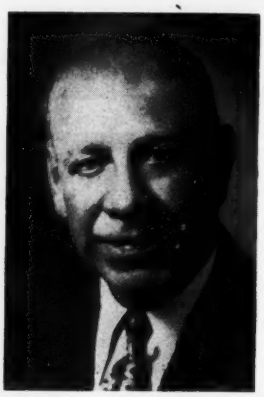
John A. Bukowski was appointed general superintendent, **Atlas Foundry Co.** and **Atlas Stainless Steel Co.,** Irvington, N. J. He was works metallurgist with Worthington Pump Co.

American Brass Co., New York, elected **John A. Coe Jr.** president to succeed **Arthur H. Quigley,** now chairman of the board. **Clark S. Judd** submitted his resignation as chairman due to ill health. Mr. Coe moves up from executive vice president. **William M. Moffatt,** who has been vice president in charge of manufacturing, was elected executive vice president. **Edward M. Bleser** succeeds retiring secretary-treasurer **Edwin J. Rockwell.**

Farnsworth Chapin was appointed sales manager, **Aquadyne Corp.,** New York.

Morse Twist Drill & Machine Co., New Bedford, Mass., a division of Van Norman Co., appointed **F. C. Helms Jr.** as Midwest branch manager. He will have headquarters in Chicago at the new Morse office, and succeeds **Charles F. Myers,** appointed sales manager, with office in New Bedford. **Norman S. Fagerson** was

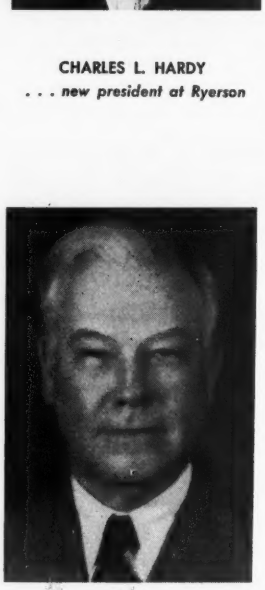
J. OLIVER BLACK
. . . chairman of Peninsular Metal Products



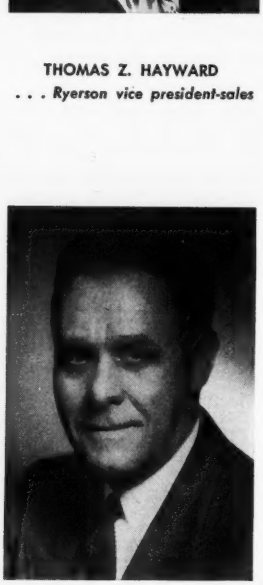
ROBERT W. BURGESS
. . . president of Peninsular

CHARLES L. HARDY
. . . new president at Ryerson

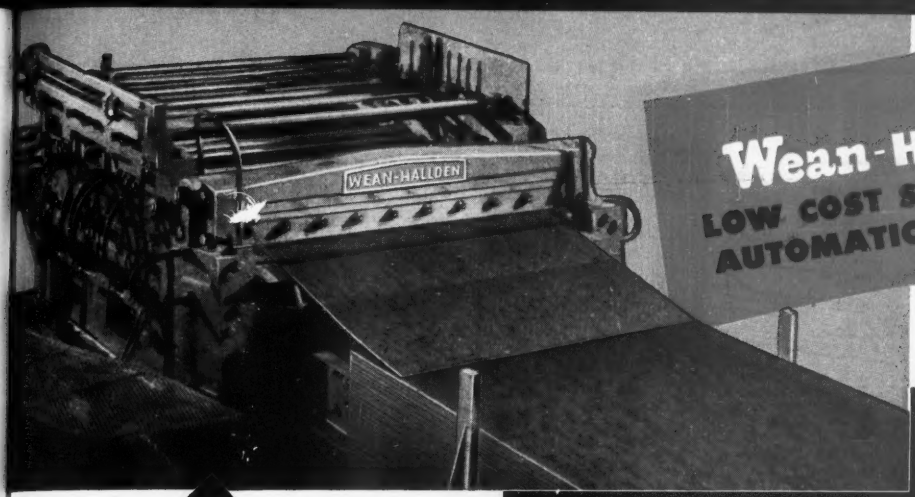
THOMAS Z. HAYWARD
. . . Ryerson vice president-sales



ARTHUR H. QUIGLEY
. . . board chairman, American Brass



JOHN A. COE JR.
. . . new president, American Brass



Wean-Hallden
LOW COST SYNCHRONIZED AUTOMATIC SHEAR LINES

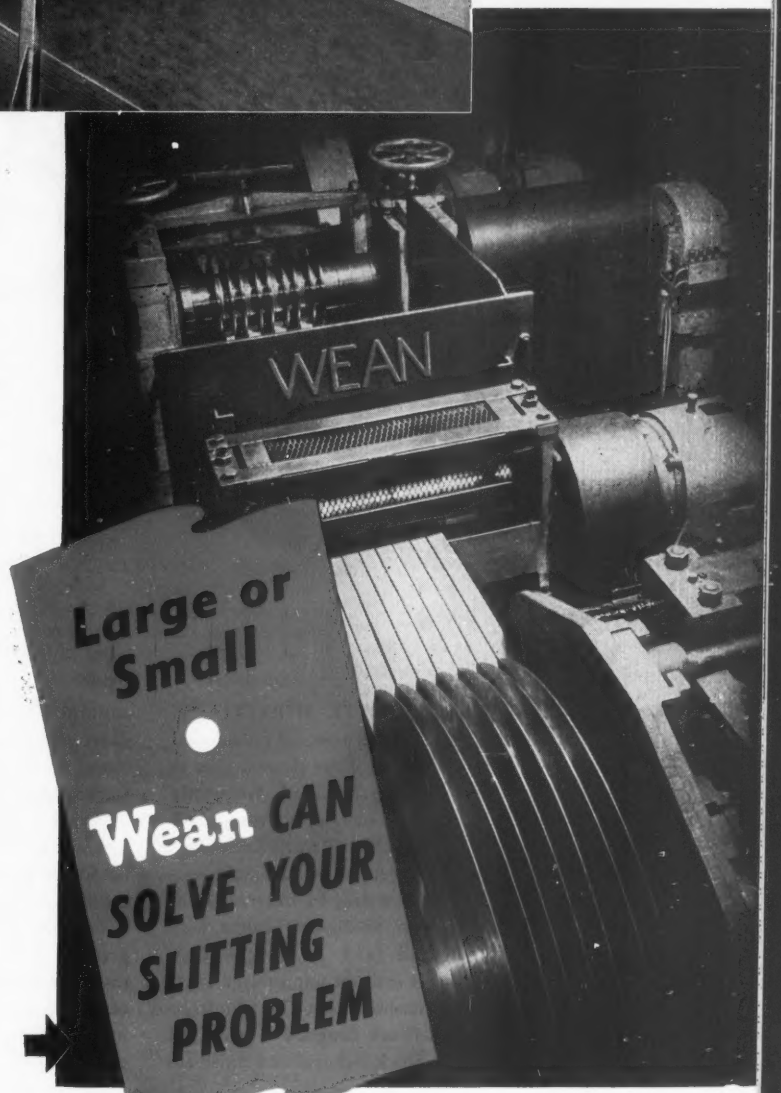
THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space,* delivers up to *twice the production.*

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

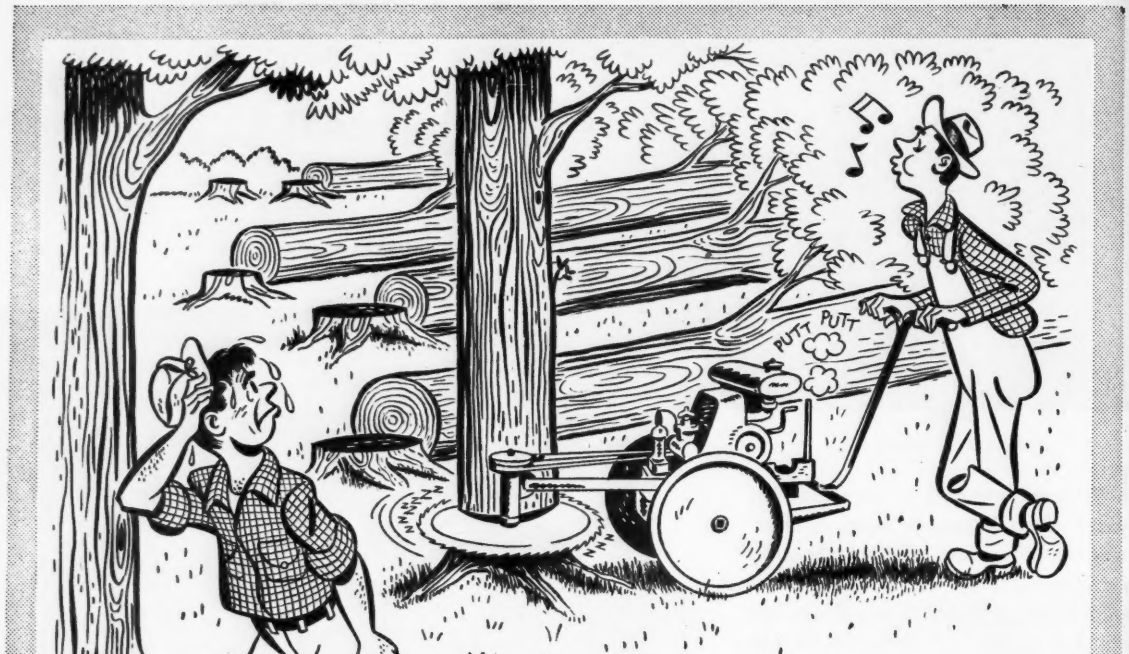
If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.



Large or Small

Wean CAN SOLVE YOUR SLITTING PROBLEM

Wean *Equipment Corporation*
CLEVELAND, OHIO



YOU SHOULD ELIMINATE SUBSTITUTE GRINDING SET-UPS. Stock removal on internal grinding may prove to be one of the slowest jobs in the shop if substitute set-ups are used. Frequently production departments are obliged to use make-shift arrangements and are expected to turn out work with fine finish and close tolerances—on time!

When substitute set-ups are used for internal grinding two things happen: first, production is slow, with "random" quality; second (and probably worse), grinding dust and grit get into the unprotected ways, and in a short time the machine has to be rebuilt.

Bryant internal grinders are designed to work fast and to close tolerances. Stock removal and finish are uniform. The machines are simple and rigid. Sensitive slides and accurate feed screws are completely protected so that grit from the wheel or dust from the work cannot ruin the machine.

Bryant builds a complete line of internal grinders to finish holes from .040 inch to 50 inches in diameter. With these machines available, the right set-up can be made for any production or tool room job.

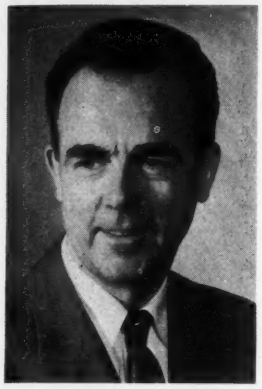
Bryant Chucking Grinder Company is prepared to give you accurate figures on production and costs so that your management can translate them into terms of investment. Send your present production figures to Bryant now. We will give you data which may help you buy that much needed machine.

Remember—it won't cost to inquire.

BRYANT

CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.



HOWARD E. MALONEY
. . . electric wire sales mgr. at Roebling's

WILLIAM J. FLEMING
. . . transfers to General Electric X-Ray

DWIGHT A. BESSMER
. . . assistant to the president at Timken

appointed a representative for Morse in Chicago to succeed **M. P. Lansing,** now representative in Texas.

Howard E. Maloney was made manager of sales, electrical wire division, **John A. Roebling's Sons Co.,** Trenton, N. J. **Frank T. Craven** was made assistant manager of sales, and **Roy H. Hainsworth** becomes eastern regional manager.

L. A. Watts was appointed assistant general sales manager, **Wickwire Spencer Steel Division,** Colorado Fuel & Iron Corp., New York. In 1950 he established and managed the pig iron and semifinished sales department. As manager he is succeeded by **R. M. Wagner,** but he continues as supervisor and director.

American Metal Co. Ltd., New York, appointed **Freeman H. Dyke** manager of its subsidiary, **United States Metal Refining Co.,** at Carteret, N. J. Mr. Dyke was with Acvero del Pacifico, Talcahuano, Chile.

William J. Fleming, vice president of engineering, Trumbull Electric Mfg. Co., a subsidiary of General Electric Co., was transferred to **General Electric X-Ray Corp.,** Milwaukee, also a subsidiary, as vice president in charge of engineering and manufacturing operations.

Arthur L. Chapman was elected a vice president, **Sylvania Electric Products Inc.,** New York. He continues as manager of the radio and television division in Buffalo and its parts division in Warren, Pa.

Pontiac Motor Division, Pontiac, Mich., General Motors Corp., appointed: **E. R. Pettengill,** administrative assistant to the general manager; **B. E. Starr,** general manufacturing manager; **A. F. Johnson,** manufacturing manager; **J. P. Charles,** assistant chief engineer; **C. O. Johnson,** general plant superintendent; and **George Guinn,** axle plant superintendent.

Timken Roller Bearing Co., Canton, O., appointed **Dwight A. Bessmer** assistant to the president. He is succeeded as director of purchases by **Paul E. Young. R. J. Archibald** was made assistant general purchasing agent.

Whiton Machine Co., New London, Conn., appointed **Evan Price** as turbine sales manager. He was in charge of turbine sales for Kissisk Co., New York.

W. E. Henges was appointed vice president, **Graybar Electric Co.,** New York. He continues as assistant to the president, to which position he was appointed in September.

Russell B. Weil joined **Franklin Metals Co.,** Newark, N. J., to serve as buyer and seller of metals.

Charles H. Besly & Co., Chicago, elected **Norman C. Minehart** as vice president in charge of its abrasive division and **Jack T. LeBeau** as manager, abrasive department.

OBITUARIES...

John P. Hoelzel, 67, president, **Pittsburgh Screw & Bolt Corp.,** Pittsburgh, died Dec. 26.

Tilden B. Anstine, 73, general superintendent, **Motor & Machinery Castings Co.,** Detroit, died Dec. 15.

Edwin J. Paulus, 62, general manager, fabricated steel construction, **Bethlehem Steel Co.,** Bethlehem, Pa., died Dec. 22.

N. A. Woodworth, founder of two Michigan manufacturing companies, died in Detroit Dec. 27. He had been in semi-retirement since the end of World War II. Mr. Woodworth began his career with Ford Motor Co., starting in the tool room, and later established and managed the company's aircraft plant. He founded **Ex-Cell-O Corp.** in 1919 and retired as its president in 1937. In 1939 he founded the **N. A. Woodworth Co.,** producer of aircraft engine parts.

John C. Rohleder, 60, president and treasurer, **Watervliet Iron & Brass Foundry,** Loudonville, N. Y., died Dec. 25.

Charles H. Cannon, 61, vice president and treasurer, **Michiana Products Corp.,** Michigan City, Ind., died Dec. 26.

Ernest P. Waud, 68, chairman of the executive committee, **Griffin Wheel Co.,** Chicago, died Dec. 22. He was associated with the company 45 years, and had served in numerous capacities prior to becoming vice president in 1919 and president in 1937.

Clermont C. Covert, 79, associated for 28 years with **W. & L. E. Gurley,** and from 1926 until its closing in 1948 manager of the New York office, died Dec. 11.

Col. Eugene C. Peck, former general superintendent and a director, **Cleveland Twist Drill Co.,** Cleveland, died at Hollywood Fla., Dec. 31.

Dr. Jacob L. Snoek, head of the physics department, **Horizons Inc.,** Princeton, N. J., died Dec. 3 in an automobile accident near Elkhart, Ind.

BROACHES and BROACHING FIXTURES

that's all we make!

Complete Broach Service

ENGINEERING

Our estimating and design engineers will analyze your broaching jobs, present or proposed, and give you actual cost and production data on new tooling . . . you know your savings beforehand.

MANUFACTURING

Every size and type of broach is manufactured in our modern plant. Highest standards of quality are assured through specialized equipment and processes from roughing operations through final inspection.

SERVICE

Detroit Broach field engineers are prompt to give you help when needed on broaching jobs in your plant. We also will setup and tryout your new broach tooling . . . thus assuring most efficient production.

Detroit Broach Company has always designed and built broach tooling exclusively . . . for every type, size and make of broaching machine.

This specialization thoroughly qualifies our engineers to give sound, unbiased recommendations on broaching procedures and tooling . . . it also means more efficient manufacture of broach tooling since our modern plant is equipped and manned specifically for that single purpose. These two factors are extremely important to you because they provide assurance that your broaching problems are in the hands of highly experienced specialists . . . and such specialization *is* necessary to obtain greatest all-round efficiency and economy from broaching applications.

DETROIT *Broach* COMPANY

20201 SHERWOOD AVE. • DETROIT 34, MICHIGAN

WORLD'S LARGEST MANUFACTURER OF

BROACHES AND BROACH TOOLING EXCLUSIVELY

Production AND Engineering
NEWS AT A GLANCE

BLAST THEM AND SAVE— Cut wire shot has contributed to the savings realized in the blast cleaning (p. 60) of automotive forgings in a large Michigan shop. The parts are tumbled down an inclined drum, the blasting area having rubber-covered plate conveyors. Scale and shot drop through the perforated plates and are separated for reuse. The equipment is not too expensive, requires a minimum of labor and has cleaned forgings at a cost as low as 80 cents a ton and at a rate of 12 tons an hour. Emerging from the blasting barrel, the cleaned pieces are deposited on a conveyor belt arranged with angle gates to deflect them down chutes to tote boxes.

FRAME OR NO?— Advocates of the chassisless type of automobile body claim this type of construction saves 60 per cent of the total weight of the conventional frame and body and also yields weight economies in engines, drive systems, suspension and axles. They figure the total available weight saving by eliminating the conventional chassis frame is equivalent to the weight of this frame, or about 225 pounds. This amounts to 9 per cent of the total steel used in the car. However, the automobile industry by no means is universally moving toward this type of construction, for one reason because of the huge investment involved in changing over manufacturing and assembly facilities. As a matter of fact, the chassisless frame has been rather slow to find acceptance, with one or two exceptions.

IN THE LAB CRUCIBLE—The search for new materials capable of holding their own in high-temperature service broadens continually. Out of two university laboratories has come a study of the possibilities of plating other metals with molybdenum which has superior high-temperature properties. While their technique of plating is a rather involved procedure, at least they produced (p. 62) an assortment of plates which showed up favorably. The best bonding of molybdenum to steel was achieved with an interlayer of electrodeposited nickel.

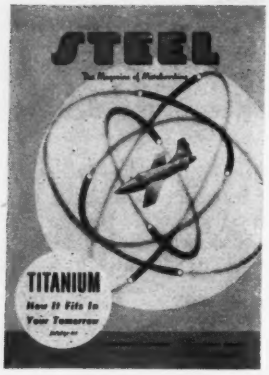
PROMOTION FOR TEAMWORK— Quality control is going great guns at Ford Motor Co. and its various technical phases are supplemented by an intensive quality promotional campaign, involving such things as posters, pay envelope stuffers, exhibits, slogan contests, motion picture films, suggestion awards, newspaper articles, even selection of a company "quality queen." The latter was described as "the girl whose 'normal distribution' the 125,000 participating employees most appreciated." Control charts are mounted on hundreds of machines throughout Ford plants to give operators a running picture of how their production may be varying from standard. The inspection function thus is brought right to the production machine. Scrap and rework are reduced. Schedules are easier to maintain. The teamwork spirit is improved.

KEEP 'EM ROLLING— If you could post a sign on every machine tool in a production operation, stating its value per minute of operating time, it might be a good reminder of the all-important fact that an idle machine is a millstone around the neck of profits, observes Guy Hubbard, our peripatetic machine tool editor. He points (p. 76) to efforts being made to minimize down time of machines—careful planning of materials handling facilities, detailed study of workholding methods and simplifying machine setups.

ATTENTION ENGINE MEN!— Cylinder liners of sintered refractory material having high hardness, with a steel outer sleeve shrunk into position to put the liner under approximately 30,000 psi tangential compressive stress, have been proposed, according to a review appearing in a British technical abstract service. Apparently tests on the unusual combination have indicated that the compressive stress prevents cracking of the refractory liner from the shock of the explosion and also results in less wear on pistons and rings because of the reduced tendency for seizure and scoring.

SIMPLE IDEA PAYS OFF— Ingenious system for inspecting both sides of coiled strip rolled at a refurbished eastern nonferrous mill (p. 72) has eliminated both turnovers and rewinding. The strip, after one side is inspected, is simply guided over a roll to reverse its direction and bring the reverse side over a second inspection table. Drive rolls are positioned at the start of unwinding and just before the rewind. The setup knocks 25 per cent off inspection time.

PATH PLOTTING AIDS NOISE SLEUTHS— To track down sources of machinery noise, acoustical detectives resort to noise circuits similar to electrical circuits. Dr. Howard C. Hardy, supervisor of acoustics and vibrations at Armour Research Foundation, Chicago, says finding the original sound source in a machine is often complicated by the fact there are secondary sources between the energy source and the radiating surface. Noises follow devious paths, all requiring careful analysis. By making schematic diagrams on which are plotted the paths that noise energy takes between its source and radiation point, the relative influence of each path can be evaluated and the simplest and most inexpensive method determined to produce results.



TITANIUM...

HOW IT FITS IN YOUR TO

Despite currently high cost, the metal—and particularly its alloys—shows such exceptional strength per unit weight at normal temperatures, plus unmatched corrosion resistance, that a broad expansion of use in aircraft and marine fields appears certain. Bottleneck is ore reduction and melting methods, but millions are being spent and a breakthrough could be imminent. Military now is commandeering virtually the entire output, estimated at roughly 2000 pounds a day, and a drop in the bucket, as against demand

BARELY out of its laboratory cocoon, titanium has skyrocketed to a position of enviable significance and portent in the field of structural materials. Where it stands now and where it is headed are questions the metalworking industry may well ponder. High strength/weight ratio and superior corrosion resistance, together with good workability, are offset by high cost and short supply, but the latter are subject to correction as the technology of the metal is better understood, and as facilities are enlarged.

From the military standpoint, of course, cost is a trifling item. Witness the statement of an Air Force general to the effect that titanium, even at $20 a pound, has no equal in a combat plane.

Economics of titanium in the air are not too difficult to prove even for peacetime use and with the metal priced in dollars per pound. A rule-of-thumb among airplane designers is that every pound of weight saved means an increase in annual revenue of $200. So if you throw out most of the stainless steel in a 40,000-pound transport like a DC-4 in favor of half-as-heavy but just-as-strong titanium, the potential revenue increase will write off a lot of high-priced metal in a hurry.

Production of titanium now is hardly beyond the pilot-plant stage. One estimate late last fall placed output at an annual rate of 120,000 pounds. By now this may have been moved up to 2000 pounds a day. Another year will see a further major increase; whether it will be abreast of the military's request for 5-25 *tons* a day is dubious. That will take time and a lot of money.

Oxides Are Plentiful—A few ABCs. The element titanium is over 150 years old but its emergence as a useful metal dates back only three or four years. Fourth most abundant structural metal (0.62 per cent) in the earth's crust, exceeded by aluminum, iron and magnesium in that order, its reserves in the form of ore are extensive. Thus far, only concentrated deposits, principally ilmenite which runs 20-40 per cent titanium oxide and 40-55 per cent iron in the form of oxide, are worked. Titanium oxide for many years has been used as a paint pigment; imports from India have accounted for as much as 40 per cent of oxide consumption for this purpose. Deposits of rutile are another source of titanium oxide, although less important than ilmenite.

Ores now being worked are widely scattered—Florida beaches, in Virginia, the Adirondacks in New York, Idaho and Quebec, Canada. Obviously, as titanium production moves from poundage to tonnage, a considerable extension of mining and concentrating operations will be necessary. Fortunately, most of the ores are loose and easily handled, either by power shovel or by dredge in the case of beach sands.

Separation of the metal from its oxide cannot be accomplished by conventional smelting methods, at least not in the present state of the art. If anyone could perfect a "blast furnace" or similar continuous method of smelting the ilmenites, he could name his own price. It is necessary to handle the reduction by a double batch-type system. First the titanium oxide is converted to a tetrachloride by subjecting it to the action of chlorine gas under heat. The tetrachloride then is fed into a cylindrical iron reactor in which molten magnesium combines exothermically with chlorine to form magnesium chloride, releasing free titanium in the form of a sponge about 99.5 per cent pure. The second phase of the process involves melting the sponge, either in an arc or induction furnace, under an inert atmosphere blanket of either helium or argon, usually the latter.

Research Is Recent and Rushed—On Sept. 14, 1948, the pigments department of E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., announced the first commercial operation to extract titanium from its ores, and until recently has been the source for probably 90 per cent of all available metal. Initial production there was confined to sponge and the plant was of pilot size with maximum daily capacity

TOMORROW

By A. H. ALLEN
Associate Editor, STEEL

Intense burst of sparks, similar to those accompanying flash welding of aluminum or magnesium, makes a spectacular show in the burnoff and upset of a roll-formed titanium ring. Flash can be removed by air jet right in the welder

American Welding & Mfg. Co.

of 100 pounds. Production facilities have since been increased and are now considered of commercial proportions. DuPont next went into the study of melting methods and offered small ingots for sale to those interested in experimental fabrication.

The research continued into methods for alloying, forging, rolling, welding and other forming processes, and extensive data obtained from these studies have been published. The company now has sponge for sale at $7.50 per pound in quantities less than 100 pounds, $5 a pound in larger quantities. It contains a minimum of 99.5 per cent titanium, 0.25 per cent maximum iron and 0.05 per cent maximum nitrogen. Facilities also are available for production of induction-melted ingots in 10, 100, 250, 400 and 600-pound size, and arc melted ingots of 50-pound size. These can be either commercially pure titanium or alloys tailored to customers' specifications.

Also pioneering in the field has been the Titanium Metals Corp. of America, a jointly-owned subsidiary of National Lead Co. and Allegheny Ludlum Steel Corp., which has been assigned the responsibility for developing, marketing and distributing the metal, its alloys and related products. National Lead is a leading producer of titanium pigments while Allegheny Ludlum is a principal producer of stainless and high-alloy steels; combination of the two was a natural for a fully-integrated operation in titanium, from ore to finished product.

National Lead mines ilmenite from its open-pit deposit at Tahawus, N. Y., and also processes rutile obtained from foreign and domestic beach deposits. Sponge is produced at the company's plant in Sayreville, N. J., and at its Titanium Alloy Mfg. division in Niagara Falls, N. Y. The latter company was organized over 40 years ago and has long specialized in producing ferroalloys for the steel industry and other users. It was acquired by National Lead in 1948.

In recent weeks National Lead has concluded lease arrangements on an 80-acre tract with seven buildings having 200,000 square feet of manufacturing

space at the state-owned Basic Magnesium Industries site in Henderson, Nev., to undertake manufacture of titanium sponge, using electric power from Boulder dam, as well as the subsequent melting of the sponge to ingot. Ilmenite ore probably will be brought in to Los Angeles by boat and trans-shipped by rail to Nevada.

Sponge titanium from the eastern sources is melted into ingots at the Watervliet, N. Y., plant of Allegheny Ludlum, where a full-scale expansion of facilities is well under way, with ingots up to 1000-pound size now being produced. They are further processed into forgings, bars, sheet, plate, strip and wire in mills at Watervliet, Brackenridge, Pa., West Leechburg, Pa., and Dunkirk, N. Y.

Power Load Heavy for Recycling—A modification of the Kroll process for reducing the oxide to sponge has been perfected, by which the resulting magnesium chloride is converted back to magnesium and chlorine in an electrolytic cell and recycled through the reactor, thereby eliminating or at least minimizing the requirement for fresh magnesium and chlorine. Major power requirement in the process is for reconversion of the magnesium chloride, a figure of 10-15 kwh per pound of sponge being generally accepted. With this arrangement, the process becomes at least semicontinuous.

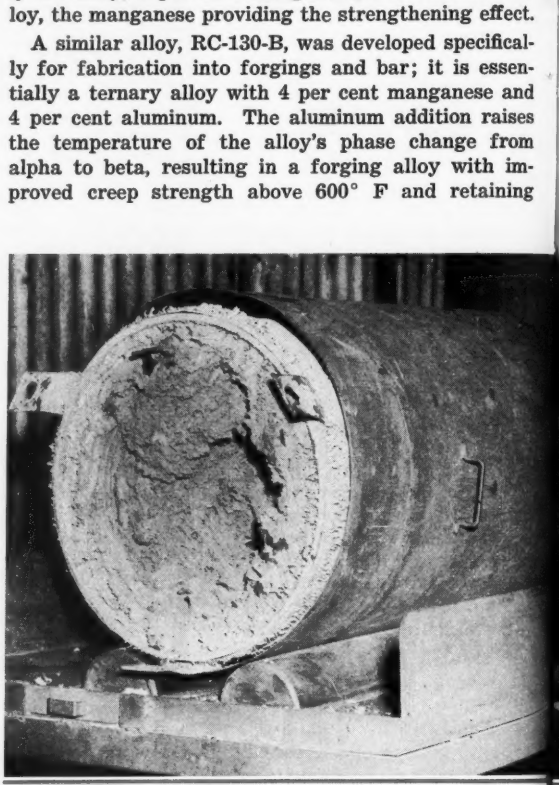
The basic process was devised many years ago in Germany by Dr. Wilhelm Kroll, at one time associated with Siemens & Halske there. It was appropriated by the Bureau of Mines in 1943, and Dr. Kroll has been with the bureau since the war. One of the first major published works on the metal was the bureau's report, "Metallurgy of Titanium and Its Alloys," released in 1946.

New Combine to Pittsburgh—Another rapidly expanding source for titanium and its alloys is Rem-Cru Titanium Inc., a manufacturing, sales and research organization jointly owned by Remington Arms Co. Inc. and Crucible Steel Co. of America. Headquarters will be established in a few months at Midland, Pa., site of a large Crucible Steel plant, modernized to the tune of $27.5 million since the end of the war. Titanium ingots currently are being produced at Remington's Bridgeport, Conn., plant, and are approaching the 1000-pound size. This operation, along with sales and research activities, will be transferred to Midland. A part of Rem-Cru's ingot processing is being done at Crucible's Sanderson-Halcomb works at Syracuse, N. Y., where facilities for rod, wire and other shapes are available. Billets, bars, plates and sheets are being rolled at the Park Works in Pittsburgh, while other Crucible plants will participate as production requirements develop. Officers and board of directors of Rem-Cru have been named entirely from the executive staffs of the two companies.

Remington Arms has been busy with titanium for over three years, enlisting the aid of Battelle Memorial Institute, Columbus, O., for alloy development, physical property testing and survey programs. Prof. Robert F. Mehl, head of the department of metallurgical engineering and director of the metals research laboratory at Carnegie Institute of Technology, Pittsburgh, has acted as a consultant on the research program for about two years.

Rem-Cru's commercial pure titanium is available in two grades—RC-70 and RC-55—with minimum yield strengths of 70,000 psi and 55,000 psi, respectively, the latter, of course, having somewhat higher ductility. The company's first commercial alloy, RC-130-A with minimum yield strength of 130,000 psi, was developed to fill requirements of the aircraft industry for a formable, structural sheet material in the intermediate temperature range. It is essentially a binary, 7 per cent manganese, titanium-base alloy, the manganese providing the strengthening effect.

A similar alloy, RC-130-B, was developed specifically for fabrication into forgings and bar; it is essentially a ternary alloy with 4 per cent manganese and 4 per cent aluminum. The aluminum addition raises the temperature of the alloy's phase change from alpha to beta, resulting in a forging alloy with improved creep strength above 600° F and retaining excellent forgeability at higher temperatures.



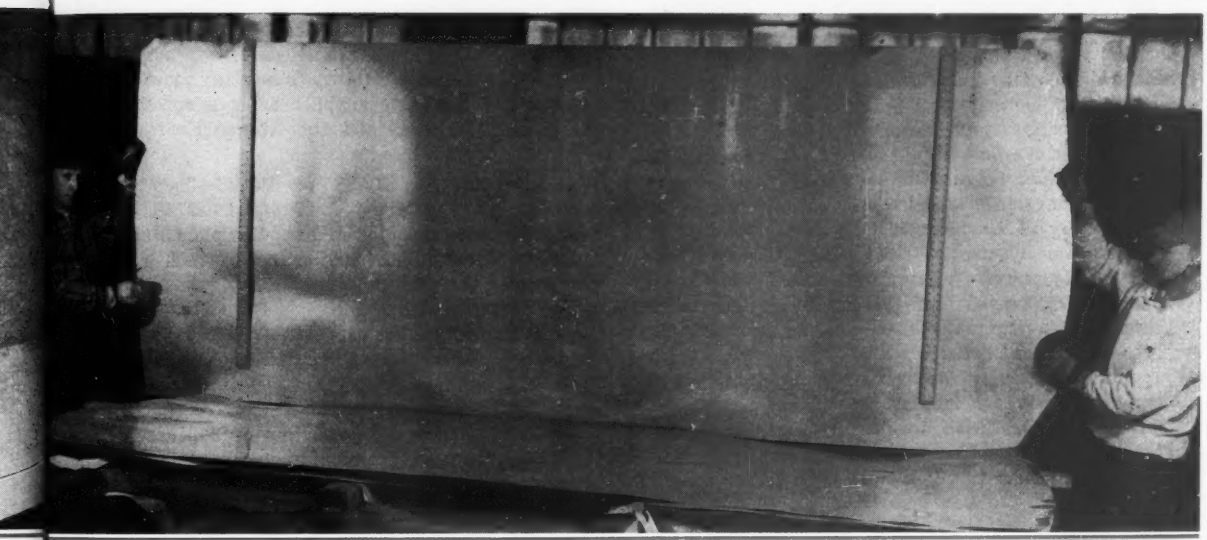
Titanium tetrachloride plus molten magnesium reacts to titanium sponge and magnesium chloride, the latter capable of being reconverted to magnesium and chlorine with considerable expenditure of power. Sponge metal looks just like ordinary gray coke

Since Du Pont owns a substantial part of Remington Arms, there naturally has been a fairly close tie-up between it and Rem-Cru in the field of titanium. However, Du Pont is careful to avoid any exclusive arrangements and is literally opening its doors to all comers insofar as supplying the metal and the technical know-how of its metallurgy and fabrication are concerned.

Titania Slag on the Way—Still another joint industrial effort, this one in the field of titanium ores, is the Quebec Iron & Titanium Corp., owned two-thirds by Kennecott Copper Co. and one-third by

New Jersey Zinc. It proposes to convert ilmenite ores mined about 500 miles northeast of Montreal into titania slag and pig iron by a novel electric furnace method, a plant now being in operation at Sorel, Que., on the St. Lawrence river 50 miles from Montreal, with initial capacity for handling 300 tons of ore daily. Ultimately there will be installed five large electric furnaces, each having six electrodes and being rated at 24,000 kva. Power will come from the new $40 million hydroelectric plant of the Shawinigan Water & Power Co. which has output equivalent to 160,000 hp, half going to Quebec Iron & Titanium.

In the process, coal, ore and limestone are mixed and under the arc iron is separated from the ilmenite, floating to the top and being tapped off for casting into pigs. The remaining titania slag has been enriched to 70-85 per cent TiO_2 from an original 35 per cent, and is cast into blocks and crushed for water shipment to Atlantic ports in the U. S. Investment in the Sorel plant is said to run to around $30 million, marking it as a major factor in the future supply of titanium oxide, both for pigments and for reduction to metal. By 1952 it is expected output from Sorel will be up to 700 tons of titania slag daily, necessitating additional sources for electric power.



Allegheny Ludlum Steel Corp.

Here is a 53 x 135-inch sheet of commercially pure titanium, 0.025-inch thick, a number of which were rolled for Boeing Aircraft last summer. Rolling practice is similar to that required by stainless steel, except for the somewhat lower heating temperature

Air and Marine Uses Dominate—Titanium is classed as a light metal, weighing 0.16 pound per cubic inch. It is 60 per cent heavier than aluminum but only 56 per cent as heavy as alloy steel. Alloys are superior in strength to most alloy steels and have a strength/weight ratio well beyond the more common engineering metals. Corrosion resistance is exceptional, much more so than aluminum alloys and considerably better than many specialty steels, particularly in salt water and marine atmospheres. In this respect it ranks with platinum and materials like Hastelloy C. Corrosion resistance is attributed to formation of a micro-thin surface coating of impenetrable and insoluble oxide.

Titanium alloys have higher fatigue resistance than aluminum, somewhat higher than steel; they are far harder than aluminum and approach alloy steel, surface hardness comparable to nitrided steel being readily obtained. The metal has much lower linear coefficient of expansion and lower thermal conductivity than either aluminum or alloy steel. Some promising indications have been observed in erosion and wear tests. Impact strength exceeds that of aluminum and a few tests have shown the likelihood of values above those for the best steel alloys.

But you can't have everything. Titanium loses strength and becomes embrittled on continued exposure to temperatures above 1000° F. While this is beyond the service range of aluminum, it is well below the operating area for high-temperature alloy steels and other complex refractory alloys. Even though its melting point is 3150° F, it appears unlikely future developments will alter the metal's excess reactivity above 1000° F. Poor creep values for pure titanium may be corrected by both cold work and alloying. Elastic moduli of alloys are higher than for aluminum but are well under the values for alloy steel. Tendency of the metal to gall makes applications involving sliding contact dubious unless suitable coatings or surface treatment can be devised. And as yet it has not been possible to weld titanium satisfactorily to other metals. Brazing is showing promise, as is cladding to carbon steel. Electroplating of chromium direct on the metal seems to be feasible.

At temperatures above 1200° F unalloyed titanium

has high reactivity with gases—oxygen, nitrogen, carbon dioxide, carbon monoxide, hydrogen and water vapor. As little as 1 per cent oxygen or nitrogen seriously impairs ductility and since the reaction is irreversible the metal becomes useless through embrittlement. Alloys are under development which show a marked improvement in oxidation resistance. The deficiency, of course, does not preclude forging and rolling at 1600-1800° F, since then the metal is at temperature a relatively short time and develops only a thin oxide film.

Melting Techniques Embryonic — Tricky as the process is for reduction of oxide to sponge, with its requirement of an argon atmosphere and frequent perplexing lack of uniformity from heat to heat, melting of the sponge to massive ingots proved just about as tough. Molten titanium gobbles up all chemically active gases and, once absorbed, they stay put for good, with resulting embrittlement of the metal. A further complication is titanium's avidity for every known refractory—equally ruinous.

Induction melting in a graphite crucible under a helium or argon atmosphere has proved feasible, but there is usually a carbon pickup of from 0.25-1.0 per cent which lowers ductility. Allegheny-Ludlum has adopted arc melting in a water-cooled copper crucible, with argon protective atmosphere. Cold copper is about the only good conductor not wetted by molten titanium, so there is no pickup from the crucible. If tungsten electrodes are used, there may be some pickup of this element, although this can be circumvented by use of either solid or powdered-compressed-sintered titanium. The molten metal usually is not tapped from the crucible, but is cooled therein to an ingot the shape of the crucible. At best, both types of melting are ill-suited to tonnage production, so it is reasonable to anticipate fairly complete revisions of melting practice before titanium can compete pricewise or quantity-wise with other structural metals.

Chemically pure titanium is difficult and even more costly to produce, about the only satisfactory method being the iodide process, first devised by Dutch scientists and involving deposition of the metal on a hot filament in an enclosed container. Battelle Memorial Institute has been pursuing the development of this process intensively.

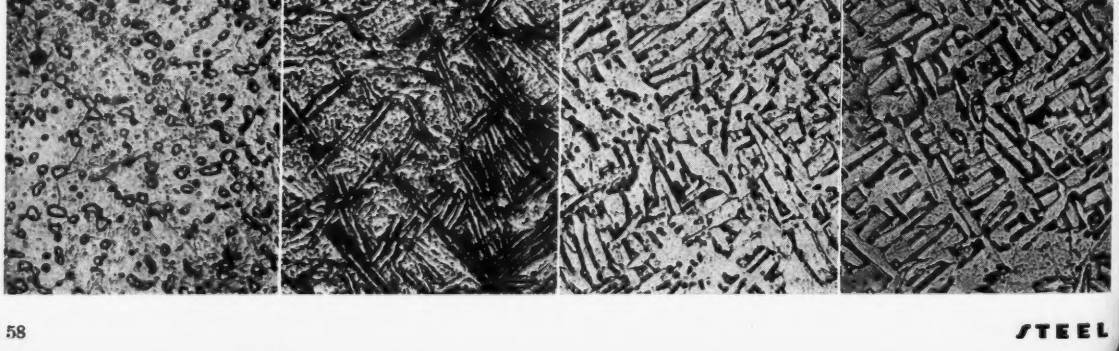
Once in ingot form, the rest is fairly smooth sailing. The metal can be rolled, forged, cold formed, ground, machined, welded and otherwise worked much as is austenitic stainless steel. A number of steel companies have experimented with rolling small ingots and report no difficulties. They tell their mill crews: "Here is some titanium. Handle it just like you would stainless steel except for heating it to a temperature 400 degrees lower." Republic Steel Corp. at Massillon, O.; Niles Rolling Mill Division of Sharon Steel Corp. at Niles, O., and Universal Cyclops Steel Co., Bridgeville, Pa., are three mills which have processed limited amounts of titanium, both in commercially pure and alloy forms. Republic also has experimented with melting the sponge, both by induction and arc furnace, making small ingots of 70-pound size. The only complaint voiced by mills and fabricators is that the work has come to practically a standstill because of inability to buy any more sponge or ingot, all available supplies being snapped up by the military services and the Atomic Energy Commission.

Forging Alloys at $10-$25 per Pound—Two proprietary titanium-base alloys, L-2748 and L-2749, are the first in a series to be offered in pilot plant quantities by P. R. Mallory & Co., Indianapolis, which has been working on their development for the past four years under contract with the Navy's Bureau of Aeronautics. Summary of the properties of these two alloys is given in an accompanying table, comparing them with cold-rolled carbon steel, stainless steel and 24ST aluminum alloy. The stronger of the two, L-2748, has a nominal composition of 3 per cent aluminum, 5 per cent chromium and 0.30-0.40 carbon. It forges readily at 1650-1725° F. Mallory has now completed installation of induction melting equipment capable of supplying ingots up to 500-pound weight. Graphite crucible and ingot mold are used, with the conventional argon atmosphere maintained over the melt.

These alloys are available in limited quantities as ingot, forged rod and bar (*Please turn to Page* 79)

Four photomicrographs of flash welded commercially pure ½-inch round titanium bar. Left to right: Parent metal; weld zone after welding; weld zone after heating 10 minutes at 1650 °F and furnace cooling; and weld zone after heat treatment for 20 minutes at 1650-1700 °F and furnace cooling. Etchant was 1 per cent hydrofluoric acid, 4 per cent nitric. X500

American Welding & Mfg. Co.



Seen and Heard in the Machinery Field

By GUY HUBBARD
Machine Tool Editor

BLOOD, SWEAT AND SCREW THREADS: Little more than two years have elapsed since a distinguished group of representatives of industries and governments of the United Kingdom, Canada and the United States, met at National Bureau of Standards in Washington and signed a mutual agreement of accord on unification of the American and British systems of screw threads.

In these troubled times when we sadly recall so many diplomatic pacts which promised so much and amounted to so-little, it is encouraging to remember that an enginering "treaty"—signed without any great amount of fanfare—not only is standing the test of time but also promises to be a factor of major importance in defense of material and spiritual ideals of the western world.

Anyone who ever has tried to insert a screw cut to one system into a hole threaded to another system, has had ample reason to regret that Sir Joseph Whitworth of Manchester, England, and William Sellers of Philadelphia, failed to come to a meeting of minds.

The British system, originated by brilliant but dogmatic Whitworth in 1845, was based on a thread angle of 55 degrees with rounded crests and roots. The American system, originated by brilliant and somewhat more affable Sellers in 1864, had a thread angle of 60 degrees with flat crests and roots. The number of threads per inch—with the exception of the ½-inch coarse thread—was the same for both.

Those minor differences in angle and shape, however, effectively barred international interchangeability. Those minor differences caused no small amount of mechanical trouble between us and our British allies in World War I. In World War II they turned out to be one major reason for the "blood and sweat" about which Winston Churchill spoke.

When the unification pact finally was signed on November 18, 1948, it was thought of primarily as of importance in facilitating commerce between our closely related countries. Today, the fact that the British and ourselves are mutually agreed on a 60 degree angle, rounded root and choice of flat or rounded external crests, spells interchangeability between countless threaded details in armament involved in our co-ordinated military undertakings. Unimportant though screw threads may seem to politicos—they very well can weigh in our favor the balance between victory and defeat.

POSSIBILITIES OF BURNISHING: Considering that roller burnishing of machine surfaces was one of the early means for attaining fine finish on circular work, surprisingly little is on record regarding the history of this system, methods employed, or even the results attained. These facts were driven home to me recently in correspondence with John O. Almen, long a key figure in General Motors' research activities.

Dipping back into my own experience, I remember clearly having seen burnishing rolls in successful operation more than 40 years ago on early model Gridley automatics. The object of these roller tools primarily was to put finishing touches on accuracy as well as surface finish. However, those "tool engineers" back in 1908 firmly believed that rolling also improved wearing quality of parts by increasing their surface hardness. In view of what has been achieved more recently by "shot peening", their belief seems to have been justified.

Dipping back still further in my recollections, I recall conversations with the late Christopher Miner Spencer, who invented the original "automatic" 80 years ago. Not only did he apply roll burnishing to his early automatics, but he in turn recalled having seen this method applied to finishing of journals on railroad axles when he first became a journeyman machinist way back at the time of the Mexican War.

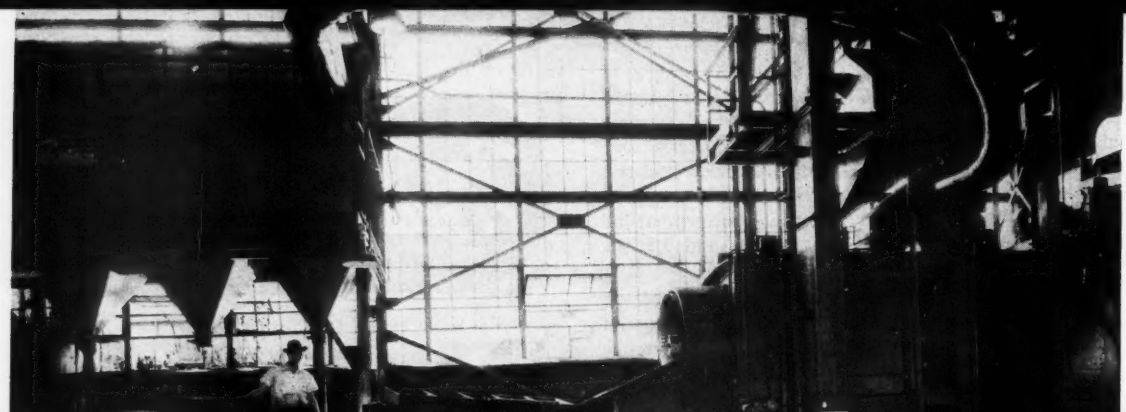
One of the interesting things about study of the history of machine shop practice is that "new ideas" often turn out to be revivals of old ideas.

As far as roller burnishing technique is concerned, that "dividend" of increased surface hardness may be an extremely important one in 1951. John Almen and other researchers recently have discovered that there are times when conventional machining does invisible harmful things below the surface when doing visibly good things on the surface. Admittedly, we still have a lot more to learn about all this. In the meantime, it may be very much in order to devote active, creative attention to surface and subsurface possibilities of rolling—taking full advantage of 1951 machines and tools in developing these possibilities.

SAE RALLIES FOR ACTION: This week I am in Detroit attending the 1951 annual meeting of the Society of Automotive Engineers. This is not merely one of the biggest conventions of one of the world's largest engineering societies. It can better be described as a great rally to the cause of national defense on the part of our most powerful single industrial group.

Infinitely more than in 1917-18, much more even than in 1941-45, our country now depends on the automotive industry for combat machines for action on the Sea, in the Air, on the Earth. Our most potent weapons today are integral with engine-driven hulls, wings, wheels and crawler treads. No longer is there a sharp line of demarkation between "vehicles" and "weapons". No longer is there a sharp line of demarkation between the automotive industry and the "munitions industry".

Like a corps of highly trained, fully equipped reserves, the entire membership of SAE is ready and waiting to get production rolling as never before in the Arsenal of Democracy.



General view of the Pangborn setup for blasting forgings. Blasting machine is at right and dust collector at top left. Sorting belt conveyor is below the collector

How Buick Cuts Forging Cleaning Cost

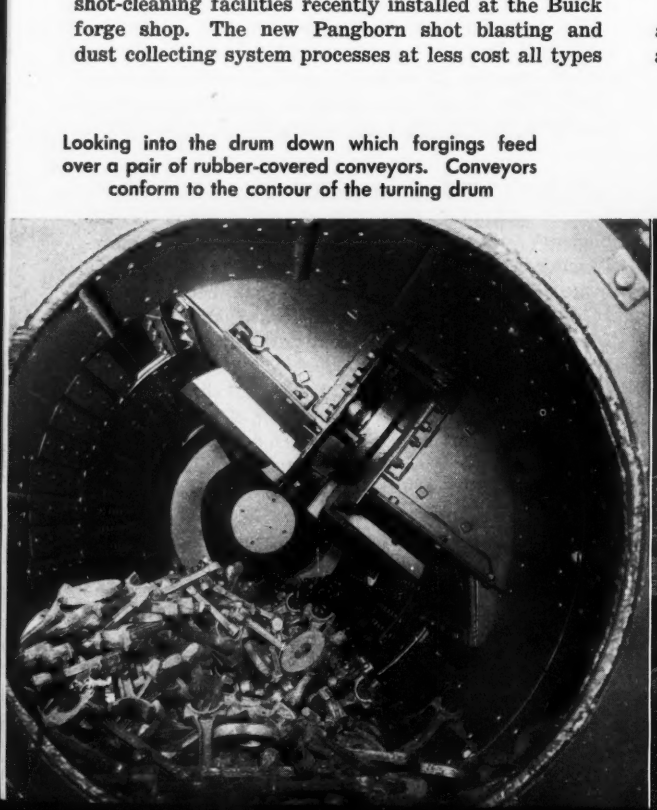
New conveyor-fed blasting system at the Flint, Mich., forge shop uses cut wire shot to clean 12 tons of small forgings per hour

By HERBERT CHASE

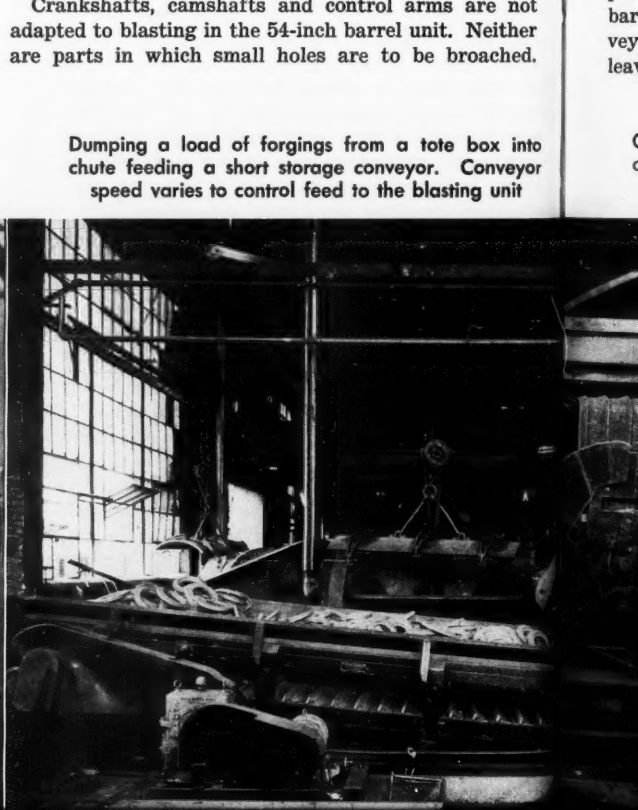
TWELVE tons of forgings per hour are descaled by shot-cleaning facilities recently installed at the Buick forge shop. The new Pangborn shot blasting and dust collecting system processes at less cost all types of forgings made in the shop up to 18 inches long.

Crankshafts, camshafts and control arms are not adapted to blasting in the 54-inch barrel unit. Neither are parts in which small holes are to be broached.

Looking into the drum down which forgings feed over a pair of rubber-covered conveyors. Conveyors conform to the contour of the turning drum



Dumping a load of forgings from a tote box into chute feeding a short storage conveyor. Conveyor speed varies to control feed to the blasting unit



These are pickled in umbrella batch-type pickling units.

Principal advantages of the new facilities are reduced labor costs and a lower depreciation rate. Maintenance costs are also expected to be less. Machining costs on blasted forgings are no higher than they were for the same pieces which had been batch-pickled.

Process Conveyorized—Blasting is done on conveyors at two stations within an inclined drum. Forgings are fed to the drum at a controlled rate by a conveyor setup built to Buick specifications. In the blasting areas, the forgings are tumbled on rubber-covered plate conveyors. These conveyors conform to the arc of the drum and constantly expose changing areas of the forgings to the blast. Although the conveyors are subject to some deterioration, they are not struck directly by the blast if the exposed area is covered by forgings, as the layout is designed to do.

Forgings to be blasted must be cool and dry. They are fork-trucked from the forging area in steel tote tubs. Tubs are lifted by an electric hoist and are dumped as required into a chute feeding a short plate-type storage conveyor, driven at a speed which can be varied whenever necessary through a gear reducer.

Speed setting determines the rate of feed to the blasting barrel, as the storage conveyor discharges onto the inclined conveyor, which, in turn, feeds the barrel. The blast is not turned on until the conveyors below the blasts are well covered with forgings.

Through Shot and Scale—Blasting conveyors are pitched so that they form in effect a part of the barrel wall. Forgings feed slowly across the conveyors as the forgings are tumbled and blasted. After leaving the blast area, the charge continues down the slowly rotating barrel over areas where scale and wire shot feed out through small holes and go through a separator, the shot being reused and the scale collected.

Dust drawn off by a fan above the barrel is exhausted into the dust collector, falls into hoppers and thence into collection cars for disposal. The whole shot blasting unit is well enclosed so that neither shot nor scale will be able to collect on the floor outside the unit.

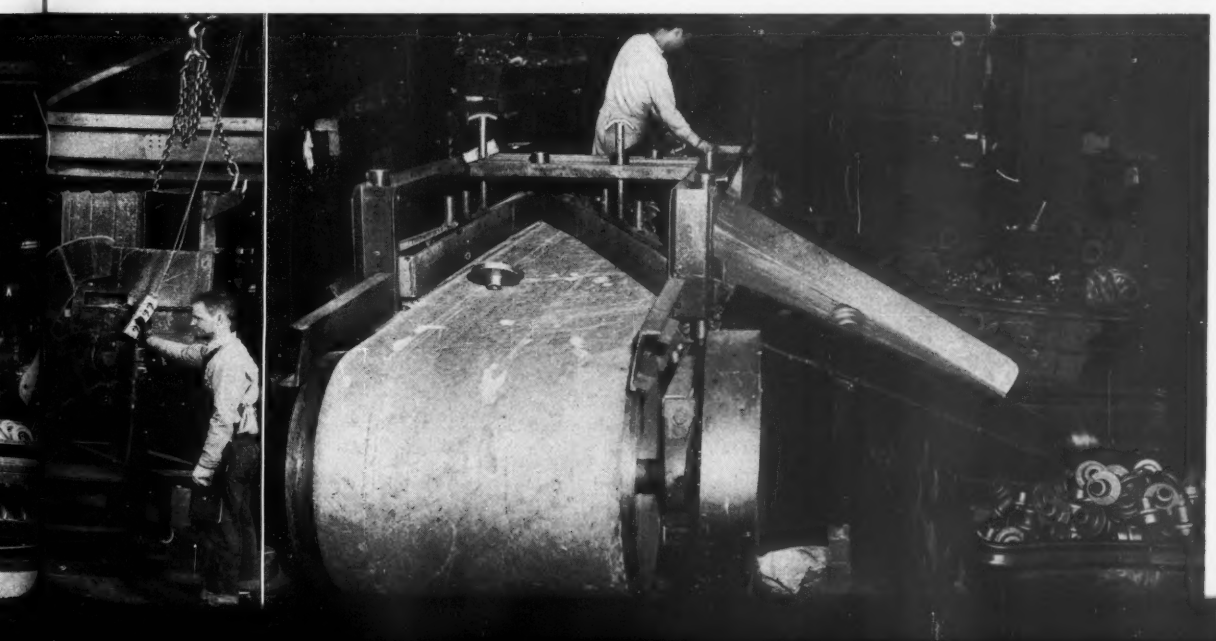
Forgings drop from the lower end of the barrel down a chute and onto a sorting belt. Above the belt are adjustable deflecting gates set to shunt the forgings into chutes feeding into tote boxes that are spotted at each side of the conveyor and also at its end.

With this arrangement, two batches of different sized-shaped forgings can be run at once; a single man at the sorting belt can see that they are deflected into different boxes. Only when more than two different batches come through at one time do any forgings have to be picked off the belt and thrown into boxes. By moving others, usually the heaviest pieces, sidewise on the belt, they are deflected into the right boxes.

Cut Wire Shot Does It—During a recent month, nearly 5000 tons of forgings were blasted in this setup, although it was not kept in continuous use. While running, the rate averaged nearly 12 tons an hour and the cost per ton, including direct labor, power and shot was below 80 cents. The No. 54 cut wire shot consumption runs 1.17 pound per ton of forgings blasted. In one day, an output of 263 tons in 22½ hours running time was attained.

No more than three men are needed at the machine; and their entire time is not required at the rate forgings are presently delivered to the machine. When the machine is running, one man cares for sorting and another tends controls and empties boxes of forgings onto the storage conveyor as needed.

Closeup of sorting belt onto which blasted forgings are fed by chute at the drum outlet, top center. Adjustable gates deflect the forging into tote boxes



MOLYBDENUM PLATING —Answer to Lower Cos

Three types of coatings produced in research study. Best adhesion on steel obtained with intermediate layer of nickel

PHYSICAL and chemical properties of pure molybdenum metal, among them its high melting point (4725° F), resistance to chemical corrosion and particularly its high-temperature strength, make it a logical choice for many present-day applications, notably military. High cost and limited availability so far have ruled out any extended use, but some metallurgists have seen the possibilities in coating other metals or alloys with an adherent nonporous layer of molybdenum in suitable thickness.

The idea, still in the laboratory stage, was elaborated on at the recent American Society for Metals meeting in Chicago by W. J. Childs, associate professor of metallurgy, Lafayette College, Easton, Pa.; J. E. Cline, physical chemist, division of industrial co-operation; W. M. Kisner, research assistant, department of metallurgy, and John Wulff, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

They believe molybdenum-coated articles might well be used as economical substitutes for those made entirely of molybdenum, and in some cases the physical properties might even be superior to those of pure molybdenum. Since the fabrication of the metal is rendered difficult by the metalworking necessary to impart adequate ductility, a further advantage may be realized in molybdenum coating a basic metal which can be more easily fabricated.

How They Did It—Plating of molybdenum by the hydrogen reduction of molybdenum pentachloride vapor was studied by the four research experts. Their apparatus was designed so that the following six plating variables could be controlled: Temperature of the specimen, rate of flow of the vapor, pressure of the vapor, composition of the vapor, duration of the coating process and the composition of the basic material. In the apparatus constructed, the range of pressures was from 10^{-5} millimeters of mercury to atmospheric, and the maximum temperature of the specimen was 2010° F.

Molybdenum pentachloride was prepared by passing chlorine over powdered molybdenum metal at 570° F. The apparatus was entirely of glass designed so that the molybdenum pentachloride could be prepared, resublimed and transferred to the plating apparatus without coming in contact with the atmosphere. By this technique chlorine and oxychlorides of molybdenum were removed from the pentachloride, and reaction with moisture in the atmosphere was prevented.

Apparatus for plating on small specimens is shown in Fig. 3. The sealed capsule containing the resublimed pentachloride was attached to the apparatus, and a magnetically-operated hammer, made of iron enclosed in glass, was placed in position to open the capillary seal when necessary. That part of the apparatus between the two stopcocks then could be evacuated and tested for leaks with a high-frequency discharge.

The pressure head of the incoming hydrogen was maintained at 13 millimeters of mercury by a pressure stabilizer consisting of a glass piston fitting loosely in a glass cylinder. The flowmeter, shown in Fig. 3, contained dibutyl phthalate as manometer liquid and calibrated in liters per hour at atmospheric pressure. The hydrogen was passed through copper gauze at 930° F to remove any oxygen. Rate of flow of the hydrogen was controlled by a stopcock. Water vapor or any other condensable impurities were re-

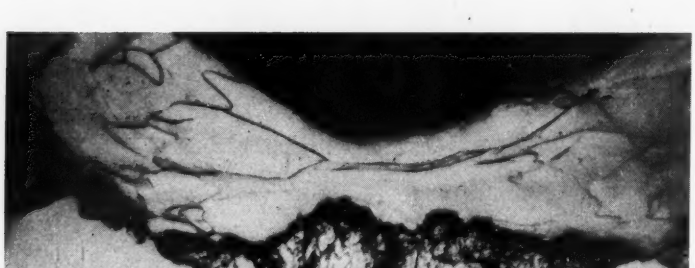


Fig. 1 (above)—Effect of chisel impression on coarse-grained deposits. Upper light zone deformed, coarse-grained molybdenum; center zone fine-grained; lower zone nickel. X500

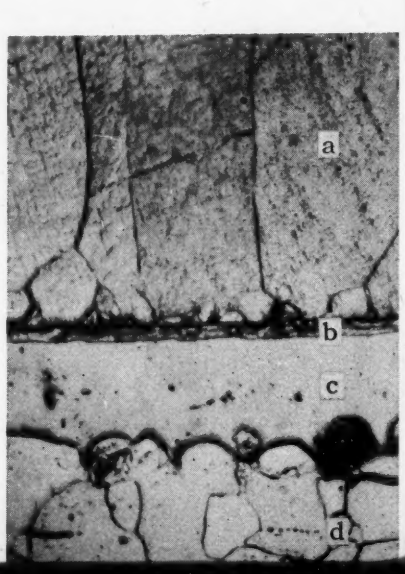


Fig. 2 (right)—Molybdenum on nickel-plated low-carbon steel. (a) Molybdenum; (b) diffusion layers; (c) nickel; (d) low-carbon steel. X1000

...wer Cost Metals for High Temperature Service?

moved from the hydrogen in a trap immersed in liquid nitrogen.

Precise Control of Apparatus—To introduce the molybdenum pentachloride into the vapor stream the capillary seal was broken by the magnetically-operated hammer. The pentachloride was then sublimed into the hydrogen stream by raising the temperature of the heater to about 85° C above that of the oil thermostat. In this way some of the pentachloride was removed from the vapor in the tubing immersed in the oil thermostat, and the vapor mixture then contained the equilibrium partial pressure of pentachloride.

Between the thermostat and the plating zone a heated sleeve was used to prevent precipitation of the pentachloride. The specimen to be plated was placed in a fused-quartz tube which was connected at both ends to Vycor glass. The Vycor tubes were connected to the Pyrex portion of the apparatus through Vycor-Pyrex seals.

The specimen was heated by a high-frequency induction coil operating from a spark generator. Temperature of the specimen was determined by an optical pyrometer in the range above 1470° F. Below this, the temperature was controlled by the current in the induction coil, using a calibration chart. To avoid contamination of the vacuum pump, the products of the plating reaction were condensed out in a second trap.

Pressure of the vapor mixture had a strong influence on the molybdenum plate. At atmospheric pressure, it was necessary to keep the partial pressure of the pentachloride below 1.5 millimeters to avoid excessive formation of powdery, nonadherent deposits. Under these conditions molybdenum coatings could be obtained at temperatures as low as 930° F, but only slow rates of plating were achieved.

At pressures of 20 millimeters of mercury and lower, molybdenum plates were obtained from 1470 to 2010° F, and no difficulty was experienced with powder formation. The partial pressure of hydrogen was generally about ten times that of the pentachloride, leaving a large excess of hydrogen over that required for complete reduction to the metal. At a pressure of 5 millimeters a plating rate of 0.020-inch per hour was reached at 1650° F, and a rate of 0.005-inch per hour at 1470° F.

Range from Fine-Grain to Laminated—Three distinct types of structure were found in molybdenum coatings deposited under different conditions. These structures are referred to as: (a) Fine-grained, (b) coarse-grained and (c) laminated. The fine-grained molybdenum was deposited at the lower temperatures, about 1110° F. The coarse-grained deposit was formed at temperatures of about 1560° F and higher

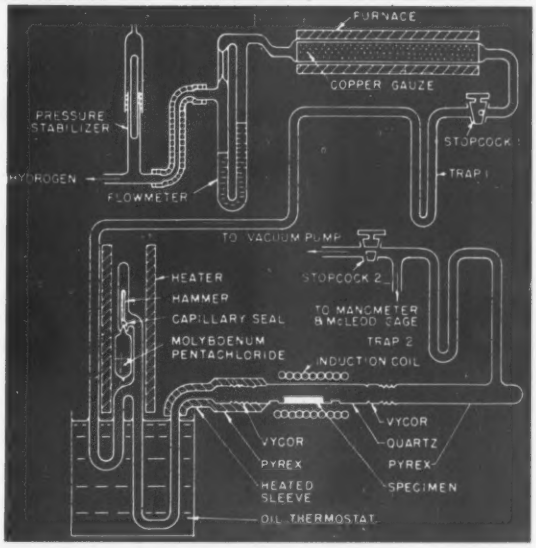


Fig. 3—Apparatus used for the vapor deposition plating of molybdenum

and at total pressures below 25 millimeters of mercury. Laminated structures developed at intermediate temperatures.

Of the three types of structure, the coarse-grained had the best properties. Its superior ductility was demonstrated by driving a chisel into the plate containing both coarse and fine-grained coatings. As can be seen in Fig. 1, the originally columnar grains of the coarse-grained deposit were greatly distorted by this test. The fine-grained deposit, on the other hand, was broken up into a number of smaller sections, and there is no indication of plastic deformation. Similarly, in measurements of hardness, a series of cracks radiated out from the impression made in the fine-grained deposit.

Even in the coarse-grained deposit the strength was better in compression than in tension. For example, when a molybdenum-coated specimen was bent with the molybdenum on the outside of the bend, the tensile forces caused the plate to crack along the grain boundaries. It was believed that the columnar structure decreased the strength of the plate in tension, and some attempts were made to improve the structure by cold working the plate followed by an anneal to cause recrystallization. Due to the brittleness of the plate, sufficient cold working was not obtained. Hot working the plate may offer a better opportunity for improvement of the structure.

Bend To Test Adhesion—In applications where the molybdenum-coated article must withstand mechanical or thermal stresses, the adhesion of the molybdenum to the basis metal is of utmost impor-

tance. As a qualitative test for adhesion, the plated specimen, ⅛-inch thick, was bent to an angle of 90 degrees with the coating on the outside. The tendency of the plate to spall off was then observed. Although cracking of the coating under the tensile stresses always took place, no spalling of the plate was observed in the most favorable cases.

The cleanliness of the metal to be coated was not found to be a determining factor in securing adequate adhesion. The specimens were cleaned with emery paper and given a preliminary treatment at the plating temperature with hydrogen to reduce surface oxides.

The intimate contact of the molybdenum coating with the base metal was indicated by the absence of voids or inclusions at the interface and by interdiffusion between the molydenum and the basis metal. Although in some cases a rough finish of the basis metal gave slightly better adhesion of the plate than a smooth finish, it was found that the most important factors in securing good adhesion were the kind of basis metal and the amount of interdiffusion with the molybdenum deposit.

Nickel Interface Is Helpful—Adequate adhesion of molybdenum on steel was accomplished by first electrodepositing a layer of nickel on the steel before depositing the molybdenum from the pentachloride vapor. A cross section of this type of plate is shown in Fig. 2.

Since there are no intermetallic phases formed in the interface between nickel and steel, the interdiffusion produced a solid solution with a gradual change in composition. This forms an excellent bond between the nickel and steel at the plating temperature used in depositing the molybdenum. The excessive formation of intermetallic compound between the steel and molybdenum was eliminated by the nickel layer, leading to an adhesion much superior to that found without the intermediate layer of nickel.

When molybdenum was deposited on copper, there was no appreciable amount of interdiffusion and the adhesion was poor. However, the addition of 5-10 per cent nickel to the copper gave an alloy on which the coating of molybdenum adhered as well as on pure nickel. The possibility exists that copper might be useful in reducing the formation of intermetallic phase between steel and molybdenum, and that an improvement in adhesion would come about in this way.

Ford Installing 17 New Test Dynamometers

A MILLION miles of "electronic highway" squeezed into a single building is being added to the engine testing, research and development facilities of Ford Motor Co. at Dearborn, Mich. Now being built by the Westinghouse Electric Corp.'s Buffalo, N. Y., plant, the added "highway" won't be actual roadway, of course, but for its job it will be even better than the real thing.

The equipment will enlarge present test facilities in the new dynamometer building of the Ford Research and Engineering Center, and includes 17 dynamometers, all complete with fully electronic controls and motor-generator sets. It represents the largest single order Westinghouse ever has received for dynamometers.

Manufacture of the equipment already is under way and the first units will be shipped early in this year. All the equipment will be shipped before next May.

Actually special electric generators that can be used either as generators or as motors, the dynamometers are designed specifically to test engines, transmissions, axles and completed cars and trucks.

Eleven engine-test dynamometers will be built, each capable of turning at speeds up to 6000 rpm and rated at 200 hp.

Runs at High Speeds—One 250-hp unit, rated at speeds up to 6000 rpm has been designed to test transmissions and torque converters used on Ford, Lincoln and Mercury cars. This equipment determines accurately the efficiency of the transmission and, more important, just what strains and stresses are imposed on the various parts in the course of normal driving.

For testing axles, there will be three dynamometers, one a 400-hp unit, rated at 1500-4000 rpm, two others 150-hp each 400-1600 rpm.

In operation the 400-hp dynamometer will deliver power to axles through a driveshaft and standard differential gears just as power normally would flow to the axles of an actual automobile. A 150-hp dynamometer will also be mounted on each rear axle, simulating the car's wheels. These smaller dynamometers will hold back, or resist the flow of power from the main unit, thus putting a load on the differential gears.

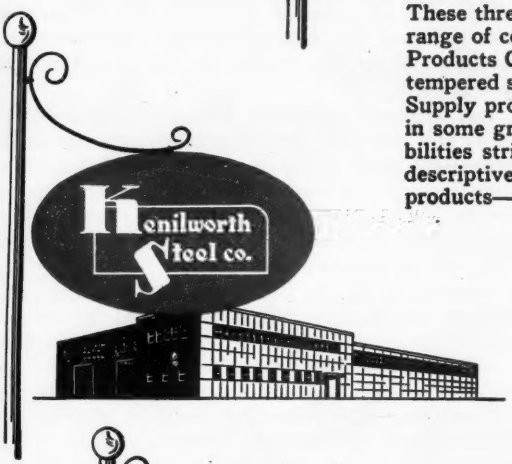
Measures Wear—Knowing the amount of power being supplied by the 400-hp unit and the amount of drag from those mounted on the axles, engineers can measure the wear and efficiencies of the axle assembly under various controlled conditions. By reversing the process they can find out what happens in the axle assembly when the car is going down hill with the engine acting as a brake. For testing completed cars and trucks, there will be two 200-hp dynamometers and mechanical roll assemblies on which the vehicles will be tested at simulated speeds up to 100 miles an hour.

With this apparatus the front wheels of a car or truck will be blocked securely in place and the rear driving wheels each will rest on a fiber roll 4 feet in diameter and 3 feet long. The two dynamometers are connected to the big rolls in such a fashion that one or both of the units can be used as desired thus providing up to 400-hp on a single shaft.

Varying the loads on the rolls, and making the car's engine work harder, simulates hills whose steepness depends on the amount of power fed to the rolls. Speeding up the rolls to overtake the wheels sends the car dashing down a synthetic grade. Flywheel plates can be added to the rolls to represent various car weights. There's even provision for simulating wind resistance at high speeds.

signs of CMP THINSTEEL warehouse service

These three steel warehouses normally carry in stock the complete range of cold rolled strip steel specialties made by The Cold Metal Products Company, including low carbon and high carbon analyses, tempered spring steel and stainless grades in the 300 and 400 series. Supply problems are now very difficult. Currently, shortages exist in some grades and sizes, but within the limits of inventory possibilities strip steel fabricators continue to find justification for the descriptive phrase long identifying all Precision produced CMP products—"More feet per pound—more finished parts per ton."



IN THE EAST IT'S
THE KENILWORTH STEEL CO.

Located in the metropolitan New York area for quick service throughout the east. 750 Boulevard, Kenilworth, N. J. Phones: New York—COrtlandt 7-2427; New Jersey —UNionville 2-6900.

IN THE MIDWEST IT'S
PRECISION STEEL WAREHOUSE, INC.

Well known in the Chicago district for good service and careful attention to customers' requirements. 4409-4425 West Kinzie Street, Chicago 24, Illinois. Phone: COlumbus 1-2700.

IN THE FAR WEST AND PACIFIC COAST IT'S
THE COLD METAL PRODUCTS CO. OF CALIFORNIA

On the west coast the only specialists in light gauge precision cold rolled strip. 6600 McKinley Avenue, Los Angeles, California. Phone: PLeasant 3-1291.

CMP **the Cold Metal Products co.**
YOUNGSTOWN 1, OHIO

NEW YORK • CHICAGO • DETROIT • ST. LOUIS • INDIANAPOLIS • LOS ANGELES

'50 Research Pays Off

RESEARCH and engineering to the tune of $50 million during 1950 produced definite technical progress for Westinghouse Electric Corp. engineers and scientists working against a background of increasing national preparedness.

New developments ranged from larger power giants for the utility industry to a new vacuum gage that "measures nothing better than anything," according to A. C. Monteith, Westinghouse vice president.

"Our research and engineering program during 1950," he declared, "was the largest in the company's peacetime history, more than $50 million being spent in exploration of new fields, in development of new products and improvement of existing equipment and in design of custom-built apparatus.

"At the same time, our entire research and engineering staffs have been on virtual 'alert' as national defense requirements increase," the executive added. "Like our manufacturing groups, they are prepared to make a quick changeover in the event of full-scale mobilization. Of course, even during 1950 a great deal of research and development effort has gone into military projects."

Research Increased During '50—Scientific progress during 1950 was reported for the company by Dr. J. A. Hutcheson, vice president and director of research. Again emphasizing that defense factors may change the picture, he disclosed that "fundamental research" —that quest for entirely new ideas—has been on the increase, with important investigations being made of super-cold phenomena, corrosion factors, gas discharges, and many other still baffling regions of science.

"On the more practical side," he said, "our scientists have developed a new x-ray image amplifier for brighter fluoroscopic images to the near-commercial stage, have discovered a new way to increase hardness of stainless steels by 300 per cent, and are hard at work in the field of color television."

Heading the list of engineering contributions during the year was the design of several huge high-speed steam-turbine generating units. With the demand for electric power increasing by leaps and bounds, company engineers responded with construction of generators delivering 150,000 kw, sufficient power to supply the needs of an entire city. This was an increase of 50,000 kw over the 3600 rpm generators built only two years ago.

Power Giants Being Built—Thirty-five generators with capacities of 100,000 kw and over now are under construction at Westinghouse. In several cases, units ranging above 150,000 kw are being seriously considered by engineers.

In the field of transportation, a brand new type of electric locomotive was introduced by company engineers. Its "heart" is an electronic tube—the ignitron —which converts alternating current into direct current. Measuring only eight inches in diameter and 30 inches high, it was developed many years ago by Westinghouse engineers, but reached its peak use during World War II when it speeded production of aluminum and magnesium.

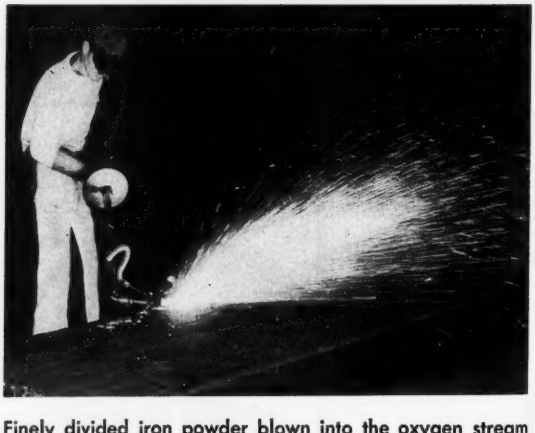
When applied to electric locomotives, the ignitron makes possible the most economical conversion of high-voltage alternating current from overhead wires to direct current to run heavy-duty driving motors on the wheels. Successful performance of the ignitron on test runs this year led to an order for two 6000 hp electric locomotives for the Pennsylvania railroad. Each locomotive will have two 3000-horsepower units and 12 driving axles. The ignitrons weigh only one quarter as much and are far less complex than the motor-generator equipment that would otherwise be necessary to convert alternating into direct current.

Gas Turbine Locomotive Tested — Company engineers also this year completed construction of an experimental 4000-horsepower gas turbine-electric locomotive and put it through miles of test runs on tracks in western Pennsylvania. In this unit, gas turbines are used to drive generators that feed electric power to motors on the wheels.

Production of jet engines for the military increased significantly during 1950 with the start of operations at the company-operated plant near Kansas City, Mo., the year's engineering report disclosed. Improvements added by their engineers have increased the "flying time" of large jet engines to a point where the interval between periodic engine overhauls is longer than the average time for correspondingly large propeller-driven planes.

In the field of atomic power, the company's program for development of a nuclear power plant for

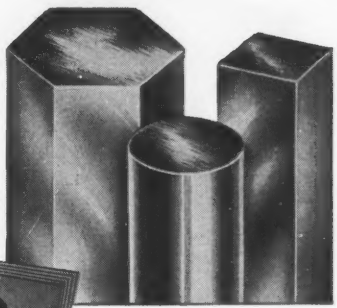
More Scarfing Heat, Less Powder



Finely divided iron powder blown into the oxygen stream of this blowpipe burns in the oxyacetylene preheat flame, when heated to ignition temperature, creating the high temperature and slagging action needed to scarf stainless steel. A development of Linde Air Products Co., New York, the Oxweld FSP-2 powder-scarfing blowpipe incorporates an arrangement for external powder feed and makes a pass 2 to 2¼ inches wide. Due to increased speed of this model, less powder is used per square foot of scarfed surface. For a 1½ ton slab, the company reports that consumption of powder has been decreased from 75 to 25 pounds

Tough Machining Problems Solved with J&L Cold-Finished JALCASE 10

J&L STEEL



Maybe you haven't gotten the word yet, but more and more machinists are "discovering" Jalcase 10 (A.I.S.I. No. C-1144), the top grade of J&L Cold-finished Jalcase. And they're getting good results, too! Here's why.

Jalcase 10 is the highest carbon grade of Jalcase; it has high mechanical and machinability properties. This makes Jalcase 10 ideal for those tough "in between" machining applications. For instance:

Many times the finished-parts specifications on a job call for a high degree of hardness, but not as high as that obtained through heat-treating the finished part. In these applications, manufacturers and machinists have found it profitable to use Jalcase 10 and dispense with the heat-treating altogether.

This saves production time and cuts down on costs. And Jalcase 10's high quality produces a better finish. It's worth your while to try Jalcase 10 on your screw machines.

GET THIS BOOKLET

FREE

You'll want more information about Jalcase 10 . . . and the other nine grades of Jalcase. Our booklet entitled "You Can Make Them Better with J & L Cold-finished Jalcase" contains information and technical data to help you produce better parts. This illustrated booklet is yours for the asking. Write today!

MAIL THIS COUPON

Jones & Laughlin Steel Corporation
404 Jones & Laughlin Building
Pittsburgh 30, Pennsylvania

— Please send me a free copy of "You Can Make Them Better with J&L Cold-Finished Jalcase".

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

JONES & LAUGHLIN STEEL CORPORATION

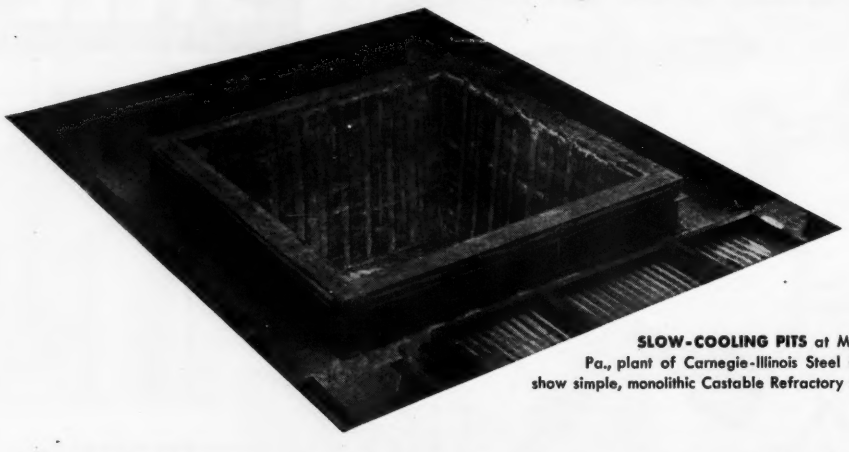
From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

DEPARTMENT OF TECHNOLOGY BUFFALO PUBLIC LIBRARY

Need Refractories FAST?

Cast them on the job using a Castable Refractory made with LUMNITE*



SLOW-COOLING PITS at McKees Rock, Pa., plant of Carnegie-Illinois Steel Corporation show simple, monolithic Castable Refractory construction.

IF YOU'RE IN A HURRY to replace slow cooling pits, car tops, furnace doors . . . practically any refractory shape . . . use Castable Refractories made with Lumnite. They reach full service strength in 24 hours or less!

Castables are easy to use. No skilled labor necessary. They come to you dry, a balanced mixture of aggregates and Lumnite calcium-aluminate cement. All you do is add water and pour into place. Your job will be finished and into production—fast!

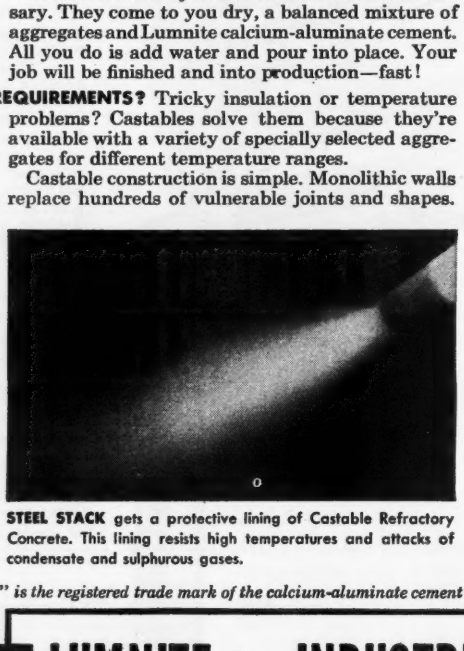
SPECIAL REQUIREMENTS? Tricky insulation or temperature problems? Castables solve them because they're available with a variety of specially selected aggregates for different temperature ranges.

Castable construction is simple. Monolithic walls replace hundreds of vulnerable joints and shapes. No daubing with mortar. And no cracks or joints to lose heat.

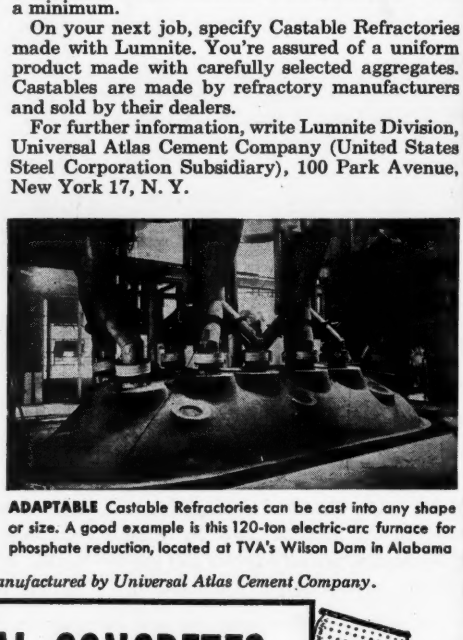
IF REPAIRS ARE NECESSARY, they can be made quickly, easily. The men in your own plant can mix and place the Castables. Outage time is cut to a minimum.

On your next job, specify Castable Refractories made with Lumnite. You're assured of a uniform product made with carefully selected aggregates. Castables are made by refractory manufacturers and sold by their dealers.

For further information, write Lumnite Division, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.



STEEL STACK gets a protective lining of Castable Refractory Concrete. This lining resists high temperatures and attacks of condensate and sulphurous gases.



ADAPTABLE Castable Refractories can be cast into any shape or size. A good example is this 120-ton electric-arc furnace for phosphate reduction, located at TVA's Wilson Dam in Alabama

*"*LUMNITE" is the registered trade mark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company.*

S-L-41

ATLAS® **LUMNITE for INDUSTRIAL CONCRETES**

REFRACTORY, INSULATING, OVERNIGHT, CORROSION-RESISTANT

A UNIVERSAL ATLAS PRODUCT

"THE THEATRE GUILD ON THE AIR"—*Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—NBC Network*

ships moved ahead with the letting of contracts for the construction of facilities at a "proving ground" near Idaho Falls, Idaho. The project is being carried forth under Atomic Energy Commission contract and in co-operation with Argonne National Laboratory. Meantime, scientists at the research laboratories made still deeper penetration into the secrets surrounding the latent power of the atomic nucleus.

New Materials for New Jobs—Also revealed in the report was the development of a wide variety of new materials for research and engineering purposes.

From the company's Transformer Division at Sharon, Pa., came a unique three-decker paint "sandwich" that stands up under anything nature can hand out, including sub-zero cold, desert heat, fog, rain, and salt-spray. Working "three musketeer" fashion—all for one and one for all—the new coating will more than double finish life on distribution transformers and help reduce the nation's $3 billion annual cost of corrosion. Key to success of the new painting system is the middle layer, made up of mica flakes embedded "shingle roof" fashion in a syrup-like plastic.

Of radically different application was a new transparent plastic—capable of being made into three-dimensional models of machine parts and tools—which made its debut in military, industrial, and university laboratories here and abroad. Developed at the Westinghouse research laboratories, the "photoplastic" is aiding scientists in gun factories, airplane engine plants, arsenals, naval laboratories, and universities in the design of stronger machinery and equipment. King-size, three-dimensional models cut from the plastic enable scientists to get a "portrait in color" of the strains encountered in tools, machine parts and other objects.

Building of bigger generators to meet the nation's increasing demand for electricity now is possible due to development of a new electrical insulation that will last at least 10 times longer than previous insulations under conditions of severe electrical stress, the report revealed.

Called Thermalastic, the new insulation consists of mica flakes embedded in a heat-resistant plastic with sufficient "stretch" to expand and contract with the generator coils. Under test, the material proved superior to previous insulations in nearly every physical, chemical, and electrical respect.

Harder Steels Produced—A low temperature treatment—at 300 degrees below zero F—was the strange road taken by company research scientists to achieve stainless steels 300 per cent harder than the best previously available. Working with engineers of the Crane Co., Chicago, the scientists discovered that if steel is first immersed in a bath of liquid nitrogen, then rolled or forged, and finally heat treated, its hardness is increased three times. The superhard metal should find many applications in bearings, valves, and other wear-resistant applications.

In the realm of the supersensitive, Westinghouse researchers came up with the near ultimate in a gage that "measures nothing better than anything." It is a tiny electronic device that measures pressures 200 times lower than any heretofore achieved, and is so sensitive that it can detect the presence of air in a vacuum system in which only one air molecule remains out of every 10 thousand billion originally present. It is aiding scientists in their study of atomic behavior.

Removes Rust, Stops Corrosion

Capable of removing existing rust and preventing further rusting of the cleaned surfaces for considerable time is Metacon 520, a material developed by Croda Ltd., Snaith, Yorkshire, England. It is said to condition the metal so that subsequent painting, galvanizing, enameling, and cellulosing have improved adhesion to that surface.

Other than a lead lined, stoneware, enameled or stainless steel tank to hold the fluid, no special equipment is needed for its application. If excessive oil or grease is present on the surface, it should be removed prior to cleaning with the compound, the company states. Application is by dipping the parts at elevated temperatures, reported to be most satisfactory between 50 and 60° C.

Light rusting may be removed without heating the solution. For deeply pitted material, an immersion of 9 to 12 minutes at the elevated temperature is recommended, but where slight rusting is involved or where the main aim is to deposit a rust preventive film 2 to 3 minutes reportedly is sufficient.

Milling with One Pass Easy

No operating difficulty has been experienced at General Electric Co., Fitchburg, Mass., by replacing a two-pass milling operation on a turbine part with a one-pass operation using a simple step fly-cutter. The four-bladed fly-cutter, using standard Carboloy lathe tools in an old fly-cutting head, is said to have reduced tool grinding and resetting costs at the Turbine Division plant.

Machining is performed in a Sellers horizontal mill with 5-inch spindle driven by 15 hp motor. The new step-cutter removes ½-inch of material, the tools being set so the cut is broken up in four ⅛-inch steps. Under the former method, the cutter is said to have stalled frequently while taking the cut in two passes.

Present setup is stated to produce a good finish while the tools need sharpening only once in 8 hours. Cutter diameter is 14 inches, while radial depth of the slots in the fly-cutting head progress 0.050-inch per slot so that each tool cuts a separate circular track.

Eliminate Outside Interferences

Improving performance of communications equipment by shielding it from outside interferences is a new sheet metal for the electronics field, produced by American Cladmetals Co., Carnegie, Pa. Consisting of a magnetic base, clad on each side with a nonferrous conductor, Electroshield metal is made in light and heavy sheets up to about 35 square feet in area.

Its effectiveness in providing clearer reception and transmission is said to be noticeable in the lower frequency ranges now employed in electronic equipment of advanced design. The shielding of instruments to reduce interferences and improve transmission has been receiving more attention.

JOB PROVED

SUN PRODUCTS OFFER YOU "JOB PROVED" PERFORMANCE

Sun's wide selection of "Job Proved" petroleum products, plus the vast experience of Sun Engineers, can help you cut costs, step up production, and improve quality. Every Sun product, after its development in the laboratory, must pass rigid and exhaustive tests in actual use. When the worth of the product has been completely demonstrated in this way, then—and then only—it is given the "Job Proved" stamp and offered for sale. Detailed product information and the help of Sun Engineers are yours for the asking. Call your local Sun Office.

SUN OIL COMPANY
PHILADELPHIA 3, PA.
Sun Oil Company, Ltd., Toronto and Montreal

INDUSTRIAL OILS

Original charge of Sunvis as good as new after three years' use in hydraulic press.

SUNVIS 900 OILS—Unexcelled for turbine lubrication, for use as a hydraulic medium, for circulating systems and similar applications requiring longest possible oil life, plus maximum protection to equipment. Sunvis 900 Oils have a high viscosity index and uniform 0°F. pour point, and are fortified against corrosion and oxidation.

SUNVIS OILS—Give long, trouble-free service in all types of industrial reservoirs and circulating systems operating at normal temperatures. Sunvis Oils have uniform high viscosity index, low pour point, and low carbon content.

SUNVIS H.D. 700 OILS—For internal combustion engines operating under heavy-duty conditions, or where hydraulic valve-lifters are used; for circulating systems and other industrial applications where contamination is a factor. The additives in Sunvis H.D. 700 Oils supply detergency, and minimize oxidation and corrosion.

SUNVIS 800 OILS—Special heavy-duty lubricating oils used in railroad diesel engines equipped with silver-alloy bearings.

SUNVIS 2200 AND SUNVIS 2300—Heavy-Duty Supplement #1 and Supplement #2 quality oils respectively. For use in diesel engines where high-sulfur fuels may be encountered.

DYNAVIS OILS—For internal combustion engines operating at moderate loads and speeds. These low-pour-point, high-viscosity-index, inhibited oils help prevent formation of harmful corrosive and sludge-forming acids.

CIRCO OILS—Straight mineral oils for general lubrication of industrial machinery. Unsurpassed for once-through applications, regardless of operating temperatures.

SUNTAC OILS—Recommended for general lubrication of all machines subjected to sudden shocks and load reversals. Compounded to increase adhesiveness, Suntac Oils cling to bearing surfaces and supply constant, superior lubrication.

STEAM CYLINDER OILS—Lubricants of high flash and fire point for saturated or superheated steam conditions and for worm gear speed-reduction units.

SUNOCO WAY LUBRICANT—Eliminates "stick-slip" of tables and scoring of ways. Noncorrosive, with outstanding metalwetting and adhesive properties, ample viscosity and E.P. qualities. Approved by 36 leading machine tool manufacturers.

ROCK DRILL OIL—High-film-strength oil for use in jackhammers, stopers, drifters, and similar equipment.

INDUSTRIAL GREASES

Sun grease increases steel mill production by cutting bearing failures 92%.

SUN GUN GREASES—Smooth greases made with medium-viscosity oil. Stable under pressure in power and booster guns.

"JOB PROVED" IN EVERY INDUSTRY

SUN

SUN ADHESIVE PRESSURE GREASES—Won't drip or splash. Excellent lubricants for open-gear applications.

SUN DARK PRESSURE-SYSTEM GREASES—For power-driven central grease lubricating systems in heavy industries. Also used as "medium cup greases."

SUN MINE CAR GREASES—Available in several grades. Suitable for both antifriction bearings and plain-bearing cavity-type wheels.

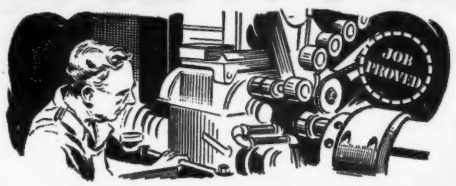
SUN MINING MACHINE LUBRICANT—Semifluid. For use where a light but adhesive grease is required. Resists separation and decomposition.

SUN ROLLER BEARING GREASES—For use on electric motors and generators and high-temperature machinery equipped with ball or roller bearings.

SUN GEAR COMPOUNDS—Black adhesive open-gear compounds and wire-cable greases. Recommended for power presses, mining machinery, worn reduction mills, crushers, pump gears, etc.

SUNOCO TRACTOR ROLLER COMPOUND—For crawler-type tractors. Provides good lubrication with exceptional sealing qualities.

METALWORKING OILS



Ball bearing manufacturer finds that Sunicut increases tool life 15%, eliminates sludging.

SUNICUT—Straight (non-emulsifiable) transparent cutting oils. Various grades for automatic screw machines and heavy-duty machining operations. Permit high speed production with excellent finishes, long tool life.

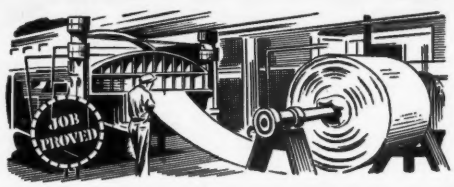
SUNOCO EMULSIFYING CUTTING OIL—An emulsifiable oil which produces a stable white emulsion. Efficient and economical cooling and lubricating medium for turning, milling, drilling, and other metalworking operations on both ferrous and nonferrous metals. It is also an excellent grinding coolant. Available in heavy-duty grades too.

SUN QUENCHING OILS—Specially refined oils designed to aid development of maximum physical properties in a wide variety of steels.

SUN TEMPERING OILS—Specially refined oils for tempering steel. Because of their low carbon content and stability under heat, these oils have an unusually long service life.

SUN ROLLING OILS—Straight and emulsifying oils which will permit maximum production in rolling steel, aluminum, brass, and copper.

RUBBER-PROCESS AIDS



Two Sun rubber-process aids save manufacturer $6,000 a year by taking the place of five competitive products.

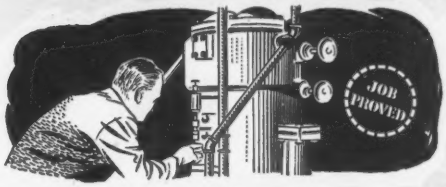
CIRCOSOL-2XH—An elasticator and process aid for natural rubber and especially for GR-S. Outstanding for sponge rubber.

CIRCO LIGHT PROCESS-AID—A processing agent and excellent softener for natural rubber, natural rubber reclaims, and neoprene synthetic rubber. Used for GR-S to some extent.

SUNDEX-53—An inexpensive product suitable for processing GR-S and blends of GR-S and natural rubber. An established process aid for rubber footwear stocks and semihard rubbers.

CIRCOMAR-5AA—A dark-colored product for processing natural and GR-S rubber used in tire-making. Also used in reclaiming natural-rubber scrap. Replaces asphalt fluxes. Free-flowing at room temperature.

REFRIGERATION OILS



Hotel turns to Suniso for its ice-making equipment; eliminates separation troubles, cuts oil costs 20%.

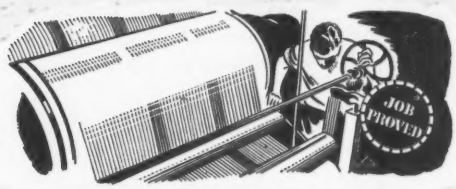
SUNISO REFRIGERATION OILS—High-quality oils having extremely low pour points, extremely low wax-separating characteristics, a high degree of stability, and long life. Initially neutral and resistant to formation of detrimental acids. Suniso grades are available to meet all low, normal, and high temperature conditions. The most widely used oils in refrigerating and air-conditioning.

SUNOCO WAXES

Waxes, "tailor made" to provide the exact properties demanded by different industries, are now available from Sun's new multimillion-dollar wax plant. Revolutionary manufacturing methods make it possible to retain only the wax portions desired for a particular use, while discarding those which might be detrimental.

Sunoco Waxes are precision-controlled for quality and uniformity of *all* physical and chemical characteristics important to the user. The various grades of Sunoco Wax are recommended on the basis of their ability to give superior performance *on the specific job.*

TEXTILE OILS



Sunotex replaces three formula components in textile mill; also saves 25% on costs.

SUNOTEX TEXTILE-PROCESS AIDS—Designed to impart desired additional properties to various fibers during their processing from the raw state into a manufactured product. All Sunotex textile-process aids are emulsifiable in water. Highest rating in Fade-Ometer tests.

SUN COTTON CONDITIONERS—Processing materials which prevent waste by cutting down excessive amounts of fly (fine air-borne lint particles).

SUN ASBESTOS FIBER CONDITIONER—Sprayed on asbestos during processing to keep fibers from being damaged or broken down. Harmful dust is minimized when this product is used.

SUN CORDAGE OILS—Generally used alone, but adaptable to various formulas used by cordage manufacturers. Selected products, highly compatible with additives.

SUNOTEX MACHINE OIL—One lubricant for nearly every kind of textile machine. A high-quality mineral oil and additive combination which prevents rust, clings to moving parts, and minimizes wear. Scours out of *all kinds* of fabrics easily and completely.

ADDITIONAL INDUSTRIAL PRODUCTS

SUN SOLVENTS—Sun Spirits for the thinning of paints, varnishes, and enamels, for metal-cleaning, and certain types of processing and extraction . . . a pure, water-white petroleum solvent free of corrosive sulfur. Other Sun solvents with special properties are available for the chemical industry.

SUN LEATHER OILS—Petroleum-base leather oils. Used for obtaining the desired tensile strength, proper temper, and controlled moisture content. Maintain a light even color, mix well, and distribute evenly.

INDUSTRIAL PRODUCTS

SUNOCO®

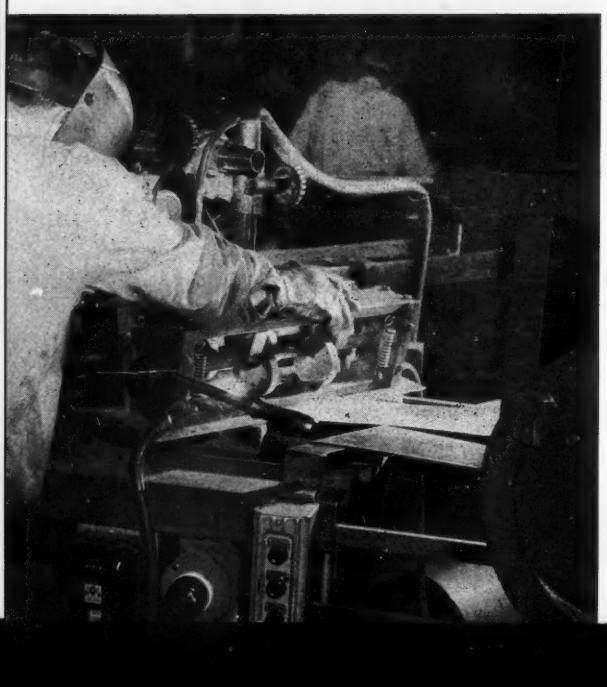
This 4-high mill rolls coils up to 14 inches wide, processing three times as much stock as any other mill in the strip department

Nonferrous Strip Capacity Expanded

By installing two new 4-high mills, an automatic coil-welder, continuous pickling systems, improved inspection techniques, better materials handling equipment and by rearranging its entire shop, Riverside Metal is gradually pushing up production of much-needed rolled copper and nickel alloys

By W. BOMBOY
Plant Superintendent
Riverside Metal Co.
Riverside, N. J.

TO MEET the growing demand for phosphor bronze, nickel silver, cupro nickel and beryllium copper alloys, Riverside Metal Co. is increasing its strip mill production. The company is currently installing new processing equipment, developing a more efficient strip mill layout and introducing better handling and production techniques.



An automatic welding machine supersedes hand methods, increasing the number of welds produced by more than 50 per cent. Ends of coils are cut and welded on a bias to give a longer and stronger weld

More Rolling Capacity — Rolling capacity was boosted with the recent installation of two new 4-high mills. One rolls coils up to 14 inches wide the other up to 8 inches. The larger 4-high, by taking greater pinches and operating at higher speeds, rolls three times as much stock as any other mill now in the strip department. This mill requires but three men to operate—one to operate the controls, one to feed strip, and one to remove rolled stock.

Quality of finished stock is greatly improved. The two back-up rolls prevent the rolls in contact with the strip from bending and hence eliminate the crown which tends to form on stock rolled between only two rolls.

Coils are welded together end to end to make it possible to feed a few large coils to the mill rather than numerous smaller coils. This reduces handling, decreases idle time and supplies customers with longer coils.

The large mill is equipped with a conveyor that sends stock to be rerolled back to the feeding side of the machine and conveys finished stock to a take off

Not One Cent for Maintenance IN 14 YEARS OF SERVICE

Circular Saw Hardening Furnace after 14 years of service—center door partly open.

THAT'S THE RECORD of B&W Insulating Firebrick in Henry Disston and Sons, Inc. circular saw hardening furnace. During 14 years, this furnace handled hundreds of tons of high grade steel. *Despite this grueling punishment, the original walls and roof of B&W Insulating Firebrick are still giving excellent service.*

B&W IFB not only made possible continuously high production, but also assured better quality control . . . due to the quick response of this brick to temperature changes. And because B&W IFB have such a very high insulating value, the fuel savings over the 14 year period were appreciable.

Performance pays off. As a result of this performance, Disston has since lined ten more furnaces of different types with B&W IFB. If you, too, want to increase furnace operating efficiency and lower production costs, discuss your refractory problems with your local B&W representative.

One of the three new Bar Heating Furnaces.

New Bar Heating Furnace under construction with B&W Refractories.

Furnace Specifications

Span of arch 13 ft. consisting of 9 in. K-26 IFB

Length of furnace 15 ft. 6 in.

Height of furnace from hearth to top of arch 2 ft. 6 in.

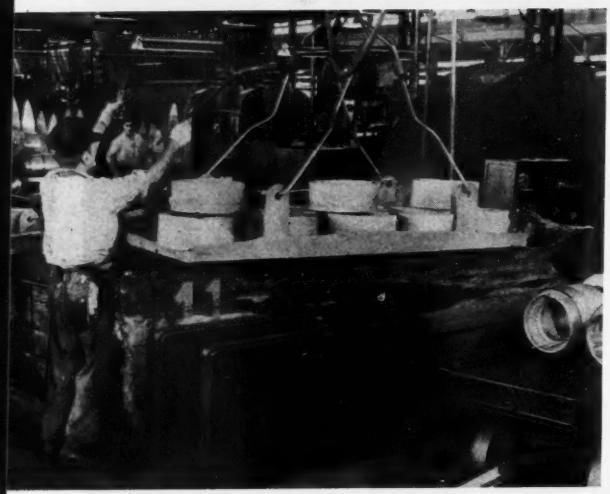
Side walls and doors 9 in. K-26 IFB

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

B-387

B&W REFRACTORIES PRODUCTS — B&W 80 Firebrick • B&W Junior Firebrick • B&W 80 Glass Tank Blocks • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS — Stationary & Marine Boilers and Component Equipment . . . Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings



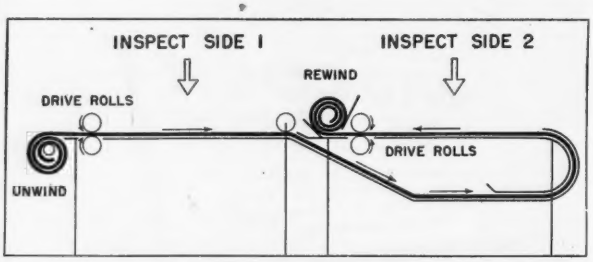
Continuous pickling systems will eliminate this kind of tank-to-tank pickling. Coils will unwind at one end of the tanks, be drawn through the tanks and rewound at the other end

point. Compressed air-operated sections of the conveyor up-end and down-end coils when entering and leaving the mill.

The pony mill now rolls narrow strip previously rolled in the same mills as wide strip. This permits the larger mills to be used to their full capacity for wide stock.

Coils Welded Automatically—An automatic welding machine speeds coil-joining. This machine supersedes hand methods and has increased the number of welds produced by more than 50 per cent. Further, quality of the weld is improved. The new machine comprises two clamps, which hold the coil-ends in place, and roller-mounted welding apparatus which travels above the clamped ends along an elevated structure to make the weld. Ends of the coils are cut and welded on a bias to give a longer and stronger weld. A new conveyor is being constructed from the welding machine to the large 4-high mill to eliminate placing coils on trucks for the short haul to the mill.

Continuous pickling systems are being installed to eliminate handling coils from tank to tank. Coils will unwind at one end of the pickling tanks, be drawn through the tanks, and rewound at the other end. A better pickling job will be obtained because every spot on the strip will be exposed to the various solutions. Dipping coils from tank to tank sometimes leaves local areas untreated. Annealing furnaces already have been installed which anneal a continuous "flow" of strip.



By guiding the strip as shown here, both sides are inspected in one operation, eliminating both turnovers and rewinding. Inspection time is cut 25 per cent

New Casting, No Cropping—A new casting system is being studied for future installation. This system will eliminate cropping, an operation which now results in an 8 per cent loss of the bar; decrease the depth of the scalping cuts; reduce porosity; permit casting of longer bars; and decrease handling operations between the foundry and breakdown operations.

Present casting operations already have been streamlined. Only three sizes of bars are now cast instead of the two dozen formerly cast. This was made possible largely by the ability of the new mills to take large pinches after breakdown.

Formerly, to inspect coiled strip, small coils were unwound, inspected on one side, turned over on the other side, inspected, and rewound. Large coils were inspected on one side as strip was passed along the inspection table to a rewind spool at the far end of the table. The coil was then unwound again, inspected on the other side and rewound. Now, by guiding the strip, both sides are inspected in one operation, eliminating both turnovers and rewinding. Inspection time has been cut at least 25 per cent.

"Stock Point" Servicing—Until the introduction of the "stock point" system, processing of customers' orders began in the foundry. Now, a stockpile of partially-rolled stock is maintained so when an order is received it is necessary merely to roll to the thickness specified, slit, cut to size and ship.

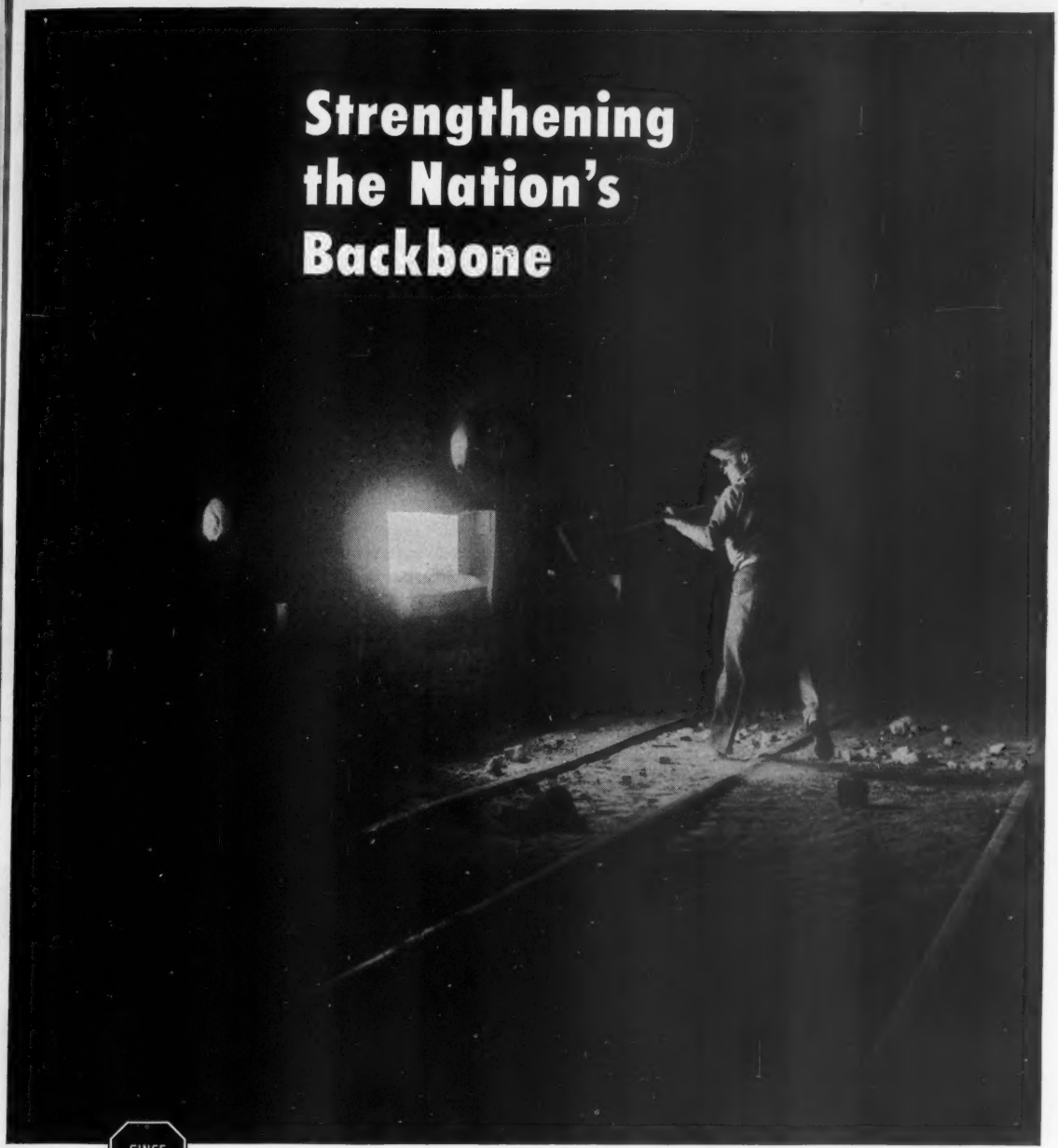
Coils are handled either by trailer-tractor or skids-and-platform-truck. Neither of these methods permits tiering. For this reason, a fork-truck-and-pallet system is being installed. The fork truck can stack pallet loads four high to take advantage of unused air space. Also, those coils now resting on the floor will be palletized to eliminate manual loading onto and off trailers or skids. The new system will also provide a neater storage area and facilitate keeping inventories.

One fork truck is expected to service the stock point and to carry coils to and from pickling, rundown, ready-to-finish, edge trimming and annealing. A second fork truck will service final rolling, annealing inspection, slitting, cutting, and shipping.

Shrinks Traveling Distances—To decrease travel distances between departments, Riverside relocated its finishing department, coil and flat shipping department, saw department, and machine shop. These changes now permit material to flow directly from one process to the next and eliminate time consuming back-tracking.

Formerly, ready-to-finish strip had to be transported some 400 feet to finishing operations and another 120 feet to the coil and flat shipping department. To cut these excessive handling distances, the finishing department was moved next to the ready-to-finish mills and the shipping department located adjacent to the finishing department. Thus, stock moves from process to process without traversing

Strengthening the Nation's Backbone



SINCE
GRANITE CITY STEEL
1878

Middle America, backbone of the nation, gets part of its strength from Granite City Steel—main suppliers of quality steel to this area since 1878.

You can depend on Granite City Steel to keep pace with Progress —to continue to be Steel Headquarters for Middle America.

OUR PRODUCTS

Ingots • Cold Rolled Coils • Strongbarn Galvanized Roofing and Siding (Patented) Cold Rolled Sheets • Electrical Sheets Tin Mill Products • Electrolytic Tin Plate Porcelain Enameling Sheets • Fabricated Products • Hi-Strength Corruform

GENERAL OFFICE and PLANT

Granite City, Illinois

DISTRICT SALES OFFICES:

Dallas, Texas
Kansas City, Missouri
Memphis, Tennessee
Minneapolis, Minnesota
Moline, Illinois
St. Louis, Missouri

GRANITE CITY STEEL COMPANY, Granite City, Illinois

long intermediate distances. In fact, the 520-foot former distance is cut to 25 feet—a saving of 495 feet per trip or 95 per cent.

Machine Shop in the Middle—The machine shop exchanged places with the finishing department and is now in a central location where it is more convenient to the departments it services. Operations which were formerly scattered throughout the mill—grinding, blacksmith, drop hammer—are moved to the central shop with a resulting decrease in idle time.

The saw department, which finishes slabs, is now 850 feet from the rolling mills and 800 feet from the shipping department. Stock must travel a total of 1650 feet from rolling to finishing to shipping. By moving the saw department next to the rolling mills, this distance will be cut to 160 feet—a saving of 1490 feet per trip.

You Need to Overhaul Workholding Methods

By GUY HUBBARD
Machine Tool Editor, STEEL

MACHINE tools have become so highly developed —so replete with hydraulic, pneumatic, electrical, electronic and complex mechanical apparatus—that there is growing tendency to overlook their basic function.

Therefore, it is well to remember that the basic function today is exactly the same function that it always was. It was and still is, "to bring tools and work into controlled contact for the purpose of removing from the workpiece, in the form of chips, the excess metal—thus producing finished work of predetermined size, shape and finish as rapidly and economically as possible.

Marble or Metal—Like the traditional statue hidden within the rough block of marble, the metal part actually is inside the rough casting, forging or block of metal. The big problem that a machine tool has to solve is to remove in the form of chips the excess metal in which the part is encased.

Like a talented sculptor, a modern machine tool has within itself the ability to do this exacting work, but—like the sculptor—it can do it effectively only when provided with suitable tools and with proper means for holding the workpiece on which these tools are to operate.

The only time when a production machine tool actually is "productive" is when it is producing something. That is when it is removing excess metal. It definitely is not productive when it has been stopped to permit finished parts to be removed and unfinished parts to be chucked or otherwise loaded into the machine.

Materials Handling Vital—Therefore, even if it is highly efficient as a cutting machine, its overall efficiency can be very much less than that of an old style machine—if proper materials handling attention has not been devoted to this important business of unloading and reloading it. By the same token a modern, quick-firing cannon with latest type of breech mechanism would make a poor showing if the gun crew ignored its breech loading possibilities and followed the Civil War tradition of ramming the charge through the muzzle.

Many companies now are turning loose crews of tool engineers with orders to make plant-wide surveys and plant-wide revisions of workholding methods, to the end that every ounce of production be squeezed out of every machine tool. Results of such surveys are astounding. Improvements in production through revision of workholding methods in line with latest practice are equally astounding.

For example, substitution of self-centering chucks —including collet chucks—in place of independent jaw chucks, have increased output of engine lathes and turret lathes as much as 50 per cent in some cases. Where gears are being bored or ground, equally surprising results have been achieved through substitution of special chucks which grip the gears on their pitch lines, thereby getting bores in exact relation to the teeth. Incidentally, in both these cases, ordinary operators can make setups which previously required attention of highly skilled operators.

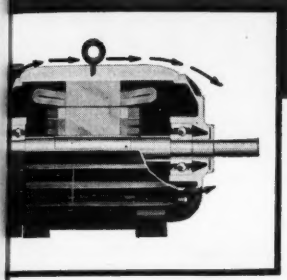
Chalk and Indicators—In general, it can be said that critical attention should be concentrated at any point in a production shop where operators are found to be using "chalk and indicators" in truing up and locating routine work, or where they are employing "tool room methods" for setting up such work on milling machines, drilling machines, lathes, turret lathes, boring machines and even planers and shapers.

In such cases a company in effect is paying for the proper jigs, fixtures and other efficient holding devices—without having the benefit of them. The resulting loss of man-hours is obvious, but the excess costs through lost machine-hours is something far more serious in these critical times.

It would stimulate corrective action if every machine had hung on it a sign reading: "My time is worth *blank* cents per minute on this job", the *blank* being filled in by carefully figured overall value "per minute" of its time as a productive tool. In many cases this value actually may be in dollars rather than cents per minute. Non-productive time very often is that costly.

Emergency Dictates Change

Selenium, added to AISI type 303 stainless, designated by Carpenter Steel Co., Reading, Pa., as stainless No. 8, has become essential in electronic and other industries, necessitating a change to sulphur as the free machining element. The company reports that in places where the selenium type is specified or required, it will furnish it on a mill manufactured basis as long as it is available. It is making an extra charge of 2½ cents per pound for selenium alloy until further notice.



ws show how the slipstream the fan continually blows away and keeps cooling surfaces free t.

fumes and moisture can't get the C-W Sealedpower motor. one was run in an atmosphere n-driven French chalk, yet not a was found inside.

The motor that keeps itself cool and clean...

You'll find it profitable to standardize on the Crocker-Wheeler Sealedpower for all applications that call for totally-enclosed motor in the 2 to 100 hp range. For this C-W motor *assures cooler running with minimum maintenance.*

It runs cooler because the distinctive finned housing adds *150% more cooling surface*—and because the integral fan continually blows a stream of cooling air over the entire cooling surface.

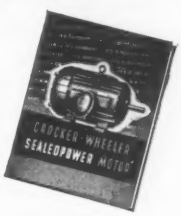
As for maintenance—the design is such that dust, fumes and moisture simply can't get inside, while the continual blast of air along the fin surfaces keeps the outside clean. Under normal conditions you never need to shut down an Elliott C-W Sealedpower motor for cleaning.

SEND FOR THIS BULLETIN

It describes all the features that assure you of *top performance with rockbottom operating and upkeep costs* from every C-W Sealedpower motor you install. Write today and ask for Sealedpower Bulletin SL-300-2A. Address your request to *Elliott Company, Dept. S. Jeannette, Pa.*

●

The Elliott C-W Sealedpower motor is available also in explosion-proof construction. Bulletin SL-300-5 covers this type. Copy on request.



Crocker-Wheeler motors range from 1 to 200 hp. Larger Elliott motors and generators are built by the Ridgway Division in Ridgway, Pa.

CW-19

ELLIOTT COMPANY

GENERAL OFFICES & MAIN PLANT—JEANNETTE, PA.

CROCKER-WHEELER DIVISION

Ampere, N. J.

BRANCH OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES

ELLIOTT *Approved* SERVICE SHOPS COVER THE COUNTRY

"You Build for your own and your country's future when you save..."

BENJAMIN F. FAIRLESS

President, U. S. Steel Corporation

"A free economy, such as ours, is built on the savings of the people. And the future security of America depends on the initiative and the growth of every citizen. We in U. S. Steel encourage our employees to join the Payroll Savings Plan, and we are proud that the National Tube Company, one of our subsidiaries, was the first of the large industrial companies of the nation in 1950 to have more than 80% of its employees participating. Remember, you build for your own and your country's future when you save."

Mr. Fairless is not expressing a personal opinion, nor is he speaking for other far-seeing executives when he tells you that our economy is built on the savings of the people and a man builds for his own and his country's future when he saves.

Actually, Mr. Fairless is merely putting in words the thoughts and action of the millions of employed men and women who *now hold* more than 50 billion dollars in U.S. Savings Bonds.

$50,000,000,000! Who *sold* all those bonds to millions of people? The answer is, nobody sold them.

80% of the employees of the National Tube Company... 75% of the employees of Carnegie-Illinois Steel Company ... thousands of employees of other U.S. Steel subsidiaries ... more than 8 million employees of other companies bought U.S. Savings Bonds and are buying them every month on the easy, automatic Payroll Savings Plan. Their employers merely offered these men and women an opportunity to save for their future. There was no pressure, no emotional appeal.

How does employee participation in *your* Payroll Savings Plan match up with the 80% of National Tube, the 75% of Carnegie-Illinois? Or, perhaps you are one of the relatively few large companies that do not have a Plan? In either case, wire or write, Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Bldg., Washington, D.C. Your State Director is ready to help you with a package plan—application blanks, promotional material, practical suggestions and all the personal assistance you may desire.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and

STEEL

Titanium . . . (*Continued from Page* 58)

and drop forgings, in the price range $10-$25 per pound. Deliveries have been made to fabricators, including Transue & Williams, Pratt & Whitney, Douglas Aircraft, Curtiss Propeller, General Electric and Westinghouse. Mallory reports excellent results in forging operations with titanium, the metal filling out dies "even better than steel". However, as with other melters, the bottleneck is the insufficient supply of sponge metal.

Applications have been exclusively in military aircraft, although Mallory has uncovered one important possibility in the commercial field about which it is not talking as yet. Jet engine forgings such as compressor disks, blades and rotors have been fabricated, along with skin around high-temperature components, formerly of stainless steel. It is figured possible to save 400 pounds in the weight of a large jet engine just by substituting titanium for stainless steel in rotor disks, and perhaps a 5-6 per cent saving in total weight of a jet craft by including other applications.

The aircraft laboratory of Wright-Patterson Air Force Base at Dayton, O., has two major research projects under way on titanium structures for aircraft and missiles (STEEL, Nov. 27, p. 60). One is the design of the complete wing for a supersonic missile; the other the design and fabrication of a complete aft fuselage section for a jet fighter, replacing all corrosion resistant alloy steel with titanium alloys.

Pyrotechnics in Flash Welding—Casing rings for the J-47 jet engine, of commercially pure titanium, have been flash butt welded, sized and machined in production quantities and on standard equipment by American Welding & Mfg. Co., Warren, O. The rings have been produced in various sizes, for both combustion chamber and tail cone assemblies. One of the larger sizes was 35 inches in diameter and of 1x1¼-inch bar stock. Formed to ring shape in rolls, the pieces were flash butt welded in a 750 kva welding machine, using a burnoff of about ¾-inch and an upset of ¾-inch. Bursts of intense bluish-white sparks, similar to those observed in welding of magnesium and aluminum, accompanied the welding operation. Considerable latitude exists in settings of time and current on the machine, a typical sequence being a 15-second cycle of burnoff and upset. Flash is easily removed by an air jet played on the joint while it is still hot in the welding machine.

Rings were reheated to 1600° F before being sized on expanders, and it was found desirable to carry out the heating as rapidly as possible. Machining was handled at surface speeds and feeds far beyond those recommended in most published data. For example, with the use of carbide tools, speeds in excess of 300 feet per minute with a feed of 0.012-inch per revolution resulted in an excellent finish. This compares with Titanium Metals' report to the effect majority opinion favored the use of high-speed tools, with feeds of 0.002-0.010-inch per revolution and speeds of 35-45 feet per minute.

Machining of the rings at American Welding required the development of a narrow flange midway on either side, approximately 0.090-inch thick; this for subsequent welding to the formed sheet metal of the casing.

Experimental work on flash butt welding was done at American Welding early in 1949, using ½-inch round rods received from Remington Arms. Summary of the laboratory report issued at the time showed the weld zone in the as-welded condition to contain an acicular structure. Annealing at 1650-1700° F, with no protective atmosphere, changed the structure to fine dendritic shaped grains, while extended annealing at the same temperature caused grain growth. Photomicrographs on page 58 show some of the structures developed. One weld tested to breakdown had a tensile of 115,000 psi and the fracture occurred in the parent metal. All welds were proof loaded at 22,000 pounds, or 105,000 psi, with no failures.

P. R. Mallory has made extensive tests on spot welding of its alloys in sheet form. In spot welding 1/16-inch sheets, welds disclosed rupture strength of 4500 pounds, although there was a noticeable loss of ductility in the metal. Time, current and pressure were not found to be critical factors.

DuPont reports on primary forming operations, using commercially pure titanium (99.5 per cent Ti):

Forging

Based on experimental work carried out with laboratory equipment, but employing ingots of considerable variation in carbon, nitrogen and oxygen, the best temperature range for forging has been established at 1450-1850° F. As the amount of carbon, nitrogen, oxygen and other alloying elements is increased, higher temperatures are frequently needed. All heating of reasonably thick sections can be done in air. Oil, gas and electrically heated furnaces have been employed.

Hot Rolling

Forged billets which have been spot ground to remove gross surface defects can be hot rolled at temperatures from 1350-1500° F. Surface tempera-

TYPICAL COMPARATIVE STRENGTH/WEIGHT VALUES OF TITANIUM AND SOME ALLOYS

Property	Commercially Pure Titanium* Annealed Sheet	½ Hard	Full Hard	75ST	24ST	302 Stainless Steel
			400° F.			
0.2% Offset Yield / Density	214	500	460	394	208	122
Ultimate / Density	318	520	586	405	276	238
			800° F.			
0.2% Offset Yield / Density	146	257	312	...	...	119
Ultimate / Density	220	275	326	...	...	217
			1000° F.			
0.2% Offset Yield / Density	78	110	107	...	...	119
Ultimate / Density	100	140	122	...	...	196

* As produced by Remington Arms Co. Inc.

Note: All values in tables to be multiplied by 10^3. Density, Ti taken as 0.164 lb/cu in.; aluminum alloys as 0.101 lb/cu in.; stainless steel as 0.286 lb/cu in.

ture should not fall below 1100° F for induction melted ingots and 900° F for arc-melted ingots. Again, as alloying elements—carbon, nitrogen, oxygen, aluminum, chromium and iron—are incorporated, minimum temperatures may of necessity have to be increased.

Annealing

Sections up to 1 inch thickness are satisfactorily annealed at 1300° F in air for one hour. A stress relief anneal can be accomplished by heating at not over 570° F in air for one hour. Where anneals of thin sections, as in the case of foil, fine tubing or wire are required, vacuum annealing should be used.

Descaling

Best carried out in a conventional sodium hydride bath with a 20-30 minute treatment. This may be followed by a brightening dip for 10-15 seconds in a 2 per cent hydrofluoric, 10 per cent nitric acid mixture.

Cold Rolling

A good finish with a minimum of edge cracking can be obtained by conventional equipment and methods, although rolling becomes more difficult as alloying elements increase. Titanium produced by the iodide process can be cold reduced 98 per cent. Commercial pure metal can be cold reduced 30-50 per cent.

Welding

Preliminary experiments at General Electric, Linde Air Products and DuPont experimental engineering labs indicate titanium can be spot welded, seam welded and inert-arc welded to itself. Some weaknesses of the metal at the weld have been observed with sheet of high carbon content.

Machining

Preliminary tests show machining to be similar to that for austenitic stainless steel, with either high-speed or cemented carbide tipped tools in drilling, reaming, milling and turning operations. Slower speeds and heavier feeds than those used for 18-8 stainless steel are recommended. Lubricants are the same.

Sawing

Cold saws, power hack saws, abrasive cutoff wheels and powder cutting have been successfully employed on sections up to 6-inch diameter. Shapes up to 12-inch diameter have been separated with parting tools. It has been found that tool life and cutting speed are improved by maintaining a heavy feed; otherwise, the tool or blade has a tendency to "ride" on the work.

Bulk of titanium production thus far has been of the commercially pure type. Titanium Metals Corp. identifies this material as Ti-75A, having nominal composition of 0.10 per cent iron, 0.02 per cent nitrogen and a trace of oxygen. Physical properties as annealed are: Hardness 175 Vhn, ultimate strength 70,000-80,000 psi, yield 45,000-55,000 psi, elongation 20-30 per cent and reduction of area 45-70 per cent. It does not respond to heat treatment, but may be cold worked to well above 100,000 psi tensile. Many

AVERAGE ROOM TEMPERATURE PROPERTIES OF COMMERCIALLY PURE TITANIUM AND TITANIUM ALLOYS

Property	Commercially Pure Titanium RC-55[a]	Commercially Pure Titanium RC-70[b]	Titanium Base Alloys RC-130-A[c]	Titanium Base Alloys RC-130-B4.[d]
Ultimate tensile strength (psi)	75,000	90,000	150,000	145,000
Tensile yield strength (psi)	65,000	80,000	140,000	135,000
Proportional limit (psi)	50,000	52,000	105,000	105,000[f]
Modulus of elasticity (psi)	15.5x10[6]	15.5x10[6]	15.5x10[6]	15.5x10[6]
Elongation (%)	25	20	12–15	15–20
Bend radius (sheet)	1.5–2.0T	2.0–2.5T	1.5–3.0T	.....
Creep strength at 10-4%/hr (psi)	.....	55,000	110,000	115,000[f]
Fatigue endurance limit (psi)	.....	50,000	75,000	80,000[f]
Impact strength (ft-lbs) (bar)	.....	15[e]	.....	13

[a] RC-55 is Rem-Cru commercially pure titanium with a 55,000 psi minimum yield strength.
[b] RC-70 is Rem-Cru commercially pure titanium with a 70,000 psi minimum yield strength.
[c] RC-130-A is Rem-Cru titanium-base *sheet* alloy with a 130,000 psi minimum yield strength.
[d] RC-130-B is Rem-Cru titanium *bar and forging* alloy with a 130,000 psi minimum yield strength.
[e] Forged bar properties—all other values listed in this table are sheet properties.
[f] Estimated from limited data.

TENTATIVE PHYSICAL PROPERTIES OF TWO TITANIUM ALLOYS
Comparison With Other Structural Alloys
(Forgings)

Property	Mallory titanium alloy L-2749	Mallory titanium alloy L-2748	Steel, cold rolled SAE 1010	Steel, stainless type 302	Aluminum 24ST alloy
Ultimate tensile strength, psi	90,000	165,000	55,000	90,000	70,000
Yield strength (0.2% offset), psi	75,000	153,000	25,000	35,000	41,000
Elastic modulus (x10[6]), psi	16.3	18.0	30.0	29.0	10.0
Elongation (% in 2 inches)	18	10	20	50	15
Endurance limit—fatigue, psi	63,000	95,000	.....	.....	18,000
Coefficient (°C) of linear thermal expansion	10.4x10[-6]	9.0x10[-6]	13.5x10[-6]	18.0x10[-6]	23.2x10[-6]
Density—lbs/cu in.	0.16	0.16	0.28	0.29	0.10
Ultimate strength/density	562,000	1,030,000	196,000	310,000	700,000
Elastic modulus/density	102x10[6]	112x10[6]	107x10[6]	100x10[6]	100x10[6]
Electrical resistivity, microhm—cm.	60	140	10	73	6
Hardness, Rockwell "A"	62	71	44	50	45

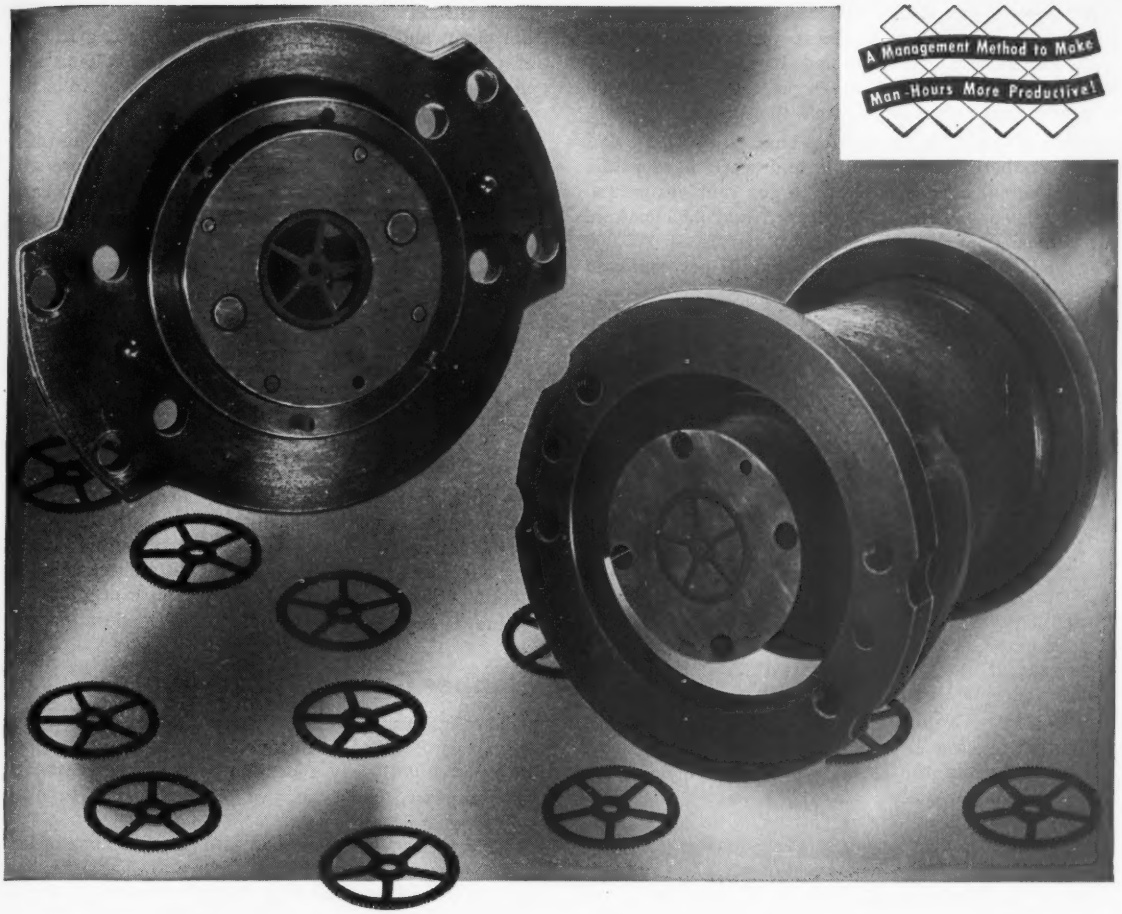
tons already have been sold, primarily as sheet, strip and wire. Base prices on sheet and strip are $15 per pound, on plate $12 a pound, on wire $10 a pound, on forgings $6 a pound. Numerous extras apply for size, cutting, quantity, finish and packing.

Titanium Metals at present markets four different titanium-base alloys, as follows:

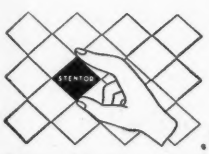
Type Ti-100A, an oxygen-nitrogen alloy used primarily for sheet, plate, strip and wire, not heat treatable but work hardenable. Iron content is below 0.1 per cent and carbon is 0.02 per cent maximum. As annealed at 1300° F it shows tensile of 100,000 psi, yield of 75,000 psi, elongation 20-25 per cent and reduction of area 45 per cent.

Type Ti-125A, an alloy primarily for sheet and strip, not heat treatable but work hardenable, with nominal composition of 1.8 per cent chromium, 0.9 iron, 0.15 oxygen, 0.02 carbon and 0.04 nitrogen. As annealed at 1300° F it shows tensile of 125,000 psi, yield of 80,000 psi, elongation of 18-20 per cent and reduction of area 45 per cent.

Type Ti-150A, alloy used primarily in bars and forgings, heat treatable and work hardenable, with nominal composition of 2.7 per cent chromium, 1.3 iron, 0.25 oxygen, 0.02 nitrogen and 0.02 carbon. Water quenching from 1700° F yields hardness of



Why Not Gear Up For Today's Production *This* Way?



For 11 years this Stentor blanking die and punch gave trouble-free performance, averaging 100,000 gears per grind. This record enabled management and production to avoid production delays by keeping machines operating with fewer shutdowns for resharpening. The precision gears, 120 teeth/90 pitch, are made from 24 ga., ¾-hard brass. In heat treatment the die moved only .0005" on the maximum diameter of the gear.

It wasn't a happy coincidence that the tool and die steel was perfectly suited to put production from the tools on a smooth, trouble-free basis. It was planned that way—with the help of the Carpenter Matched Set Method. For the Method not only enabled this plant to eliminate costly experimentation in selecting the right steel, but enabled management to forecast output in advance because they could count on the tools to produce the parts *on time*.

Used in hundreds of plants, the Method offers far more than simplified tool steel selection. It makes machine operators more productive. It enables your plant to carry lower tool steel inventories. It makes heat treating easier, simplifies toolroom and production procedures. What's more, it is amazingly easy to apply. No extra cost or bother. To discover what it can do for you, ask for the new booklet "How to Get Better Tool and Die Performance". THE CARPENTER STEEL CO., 139 W. Bern St., Reading, Pa.

Export Department: Woolworth Bldg., New York 7, N.Y.—"CARSTEELCO"

Carpenter

MATCHED TOOL & DIE STEELS

More than top-grade steels . . . a Method to keep tooling and production on schedule!

For your convenience, Carpenter carries warehouse stocks in principal cities throughout the country.

over 500 Vhn. Heavy sections require quenching to produce maximum hardness while thin sections will air harden. As annealed it shows tensile of 150,000 psi, yield of 130,000 psi, elongation 12-20 per cent and reduction of area 40 per cent.

Type Ti-175A, alloy used primarily for bars and forgings, both heat treatable and work hardenable, with nominal composition of 3.0 per cent chromium, 1.5 iron, 0.5 oxygen, 0.04 nitrogen and 0.02 carbon. As annealed at 1300° F it shows tensile of 175,000 psi, yield of 160,000 psi, elongation 10 per cent and reduction of area 30 per cent.

An annoying problem in alloy production is the precise reproduction of analysis from heat to heat. As mentioned before, the sponge itself is subject to variations and the molten metal is all too prone to pick up minute fractions of unwanted elements which often alter physical properties to a marked degree.

Huge Press Forms Plane Parts

Applying 7000 tons to the forming of large bulkheads as well as many miscellaneous small parts for the newest of Air Force bombers is a rubber pad forming press being built by Hydraulic Press Mfg. Co., Mount Gilead, O. Said to be one of the largest machines of its type, the press utilizes the Guerin process, developed to eliminate blanking and forming bottlenecks in the aircraft industry.

In this process, the rubber pad acts as a pressing medium, forcing the metal againt the form or die blocks directly beneath the sheet metal. Reported advantage of the process is that many different parts can be made simultaneously, the number and size being dependent upon the pressing surface available.

Press carries a rubber pad measuring 48 x 120 inches and is fed by hydraulically-actuated loading tables. New die blocks and sheet metal can be positioned on the loading table for loading into the press in a continuous feeding operation.

Devises Hydraulic Ore Hoist

How ore, coal, and rock may be moved from underground to the surface in a continuous stream by the hydraulic hoist was disclosed by Percy S. Gardner, Jr., Bagdad Mining Co., Phillipsburg, Mont., at a session of the 1950 Metal Mining Convention and Exposition, Western Division, The American Mining Congress.

The hydraulic hoist consists of two pipes joined together at the bottom, a motor driven pump at the top of one column circulating water downward in that column and upward in the other column. A set of loading chambers is located at the bottom of the "upward" column for the purpose of introducing ore into that column, a displacement pump at the chambers to displace a volume of water from the upper to the lower chamber, equal to the volume of ore charged into the upper chamber. A pressure equalizing valve at the chambers equalizes pressure in the upper chamber with that in the lower chamber. A dewaterizer at the top of the upward column dewaters the ore and allows the water to return to the pump for recirculation. A flywheel mounted between the pump and motor keeps the system going in case of power failure so that the ore in the column and chambers will be removed before the water falls below lifting velocity.

Ore must be crushed to a size at least one-third the pipe diameter. Velocity required to lift ore will be the same for all sizes of pipe. Capacity will vary with pipe size. Power determination is based on experiments which are found to be valid for a large model. Loading cycle is 30 seconds to 1 minute. No classification will occur in the pipe at hoisting velocities and no bridging or hangups will take place in the charging valves. No difficulty, it was reported, will be experienced with occasional large pieces if they are smaller than the pipe diameter. Foreign material, such as tramp iron, will pass the pipe readily.

Ore load in the column does not increase static pressure, Mr. Gardner stated. When the system is put into an inclined shaft power requirements are about double, and wear on the pipe increases. Loading chambers may be installed at different levels. A depth of 5000 feet, with static pressure of 2150 psi, seems feasible within the limits of modern design.

Hobber Cuts Elliptical Gears

Through use of elliptical gears a constantly varying output is obtained from a constant input. Both speed and power will vary depending upon the eccentricity of the gears. They can also be designed to produce a desired quick-return ratio.

This type of gear, with its own peculiar type of use noted above, now can be cut with a special form hob on a standard machine with a standard setup. A development of Barber-Colman Co., Rockford, Ill., the hob has a number of leads equal to one-half the number of teeth in the gear, each lead cutting two diametrically opposite teeth. Since the teeth are designed from a base ellipse rather than a base circle, even the involute curves on the opposite sides of the same tooth are not similar. Thus, each thread on the hob differs from each other thread.

Hob is topping so that gears can be cut from bar stock, eliminating necessity of locating the hob with respect to the work. The true involute teeth designed from a base ellipse produce the best possible rolling action.

Blades Bear Standard Numbers

Adoption of standard stock numbers for power-type hack saw blades is being announced by Hack Saw Manufacturers Association of America. Prior to manufacturers' approval of the code, it was submitted to National Supply and Machinery Distributors' Association and Southern Supply and Machinery Distributors' Association, receiving the endorsement of both.

The industry standard stock numbers code will be included in printed matter or otherwise used by an individual hack saw blade manufacturer as when desired by him. It will not conflict with any previously used code, the association states.

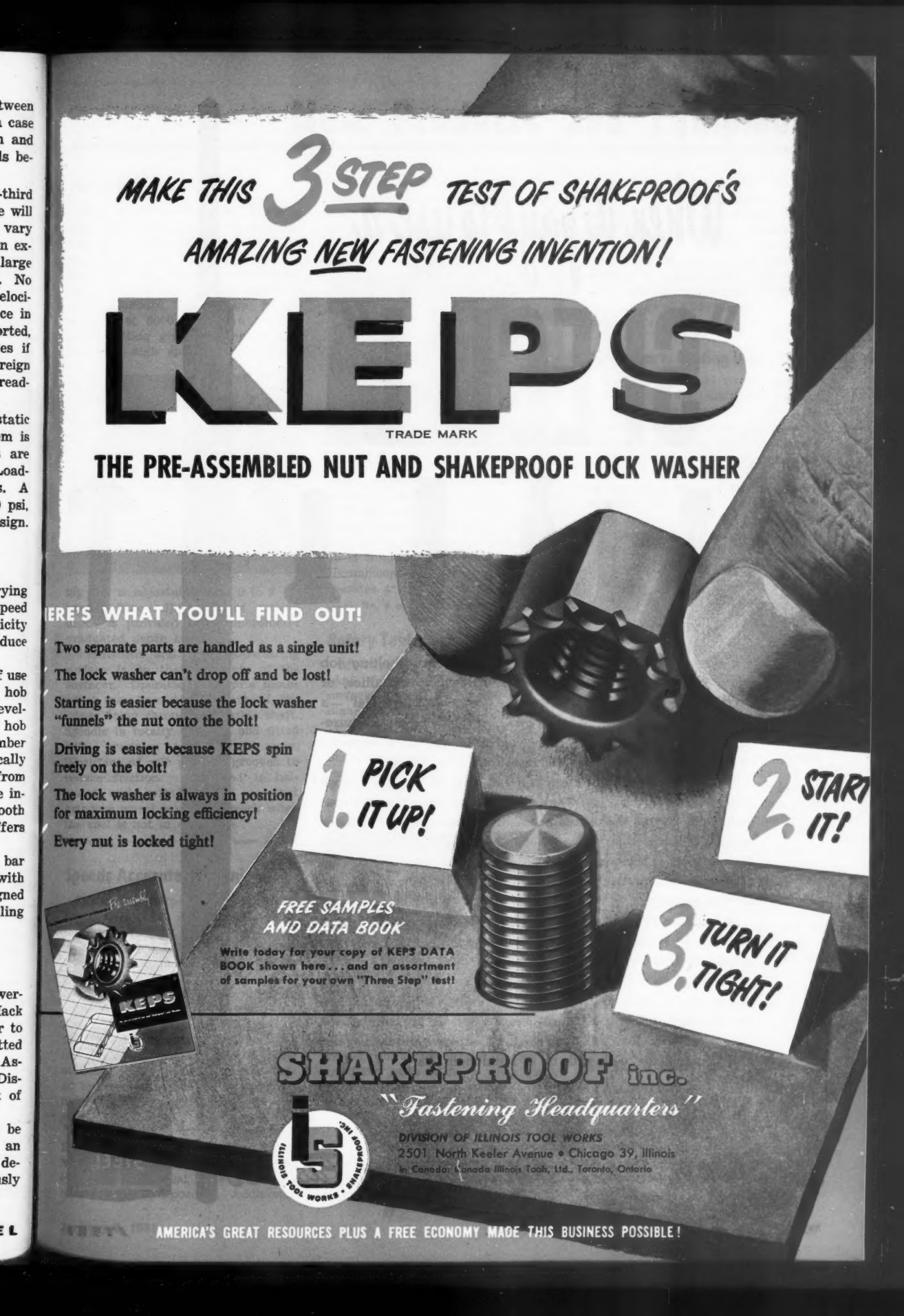
MAKE THIS 3 STEP TEST OF SHAKEPROOF'S

AMAZING NEW FASTENING INVENTION!

KEPS

TRADE MARK

THE PRE-ASSEMBLED NUT AND SHAKEPROOF LOCK WASHER



ERE'S WHAT YOU'LL FIND OUT!

Two separate parts are handled as a single unit!

The lock washer can't drop off and be lost!

Starting is easier because the lock washer "funnels" the nut onto the bolt!

Driving is easier because KEPS spin freely on the bolt!

The lock washer is always in position for maximum locking efficiency!

Every nut is locked tight!

1. PICK IT UP!

2. START IT!

3. TURN IT TIGHT!

FREE SAMPLES AND DATA BOOK

Write today for your copy of KEPS DATA BOOK shown here . . . and an assortment of samples for your own "Three Step" test!

SHAKEPROOF inc.

"Fastening Headquarters"

DIVISION OF ILLINOIS TOOL WORKS

2501 North Keeler Avenue • Chicago 39, Illinois

In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario

AMERICA'S GREAT RESOURCES PLUS A FREE ECONOMY MADE THIS BUSINESS POSSIBLE!

When it pays to use a "SPECIAL"

Whenever you encounter an out-of-the-ordinary bolting job where the use of a standard fastener presents difficulties, or isn't feasible at all, you'll find that it pays to use a "special"—a fastener specially designed to meet a particular bolting requirement. For in nearly every case, "specials" prove far superior to standard bolts, in performance as well as economy.

Making "special" fasteners is a big part of the day's work at Bethlehem's fastener plant at Lebanon, Pa. We turn out "specials" by the thousands at Lebanon. Besides, our fastener engineers are well versed in all phases of bolting, and because of their long experience in this field, they are often able to suggest improvements in design which represent greater advantages for the customer.

In addition to special fasteners, Lebanon Plant also turns out a complete range of standard items—machine bolts, carriage bolts, lag bolts, rivets, spikes, and the like.

There's a good chance that somewhere in your manufacturing operations, a "special" could serve more advantageously than the standard bolt you are now using. We'll be pleased to look into it for you. Just put it up to the nearest Bethlehem sales office, or get in touch with us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

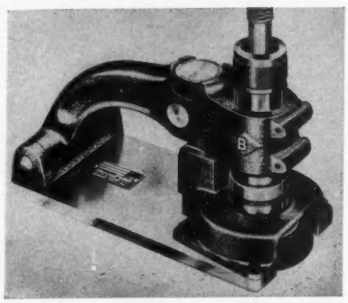
Bethlehem supplies every type of Fastener

BETHLEHEM STEEL

New Products and Equipment

Portable Metal Surfacer

Reid Brothers Co. Inc., Beverly, Mass., is offering a portable precision surfacer performing work equivalent to hand scraping with a reduction in time involved. Usable by semiskilled labor, it turns out dead-flat surfaces using standard 3-inch cup wheels working at 6000 rpm. An angular wheel setting gives varying cut for removing high spots or fine finish-



ing and is adjustable from 0 to 2 degrees. Fine adjustment of cutting depth is provided by a micrometer graduated depth stop.

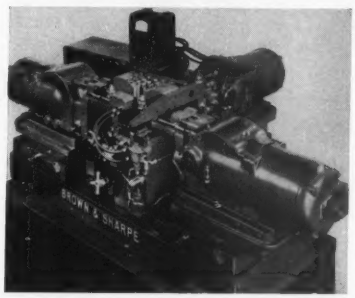
Permanent and true hardwearing surface is on the sole plate of the surfacer. Operation is from a motor which may be mounted overhead, the drives being through a flexible shaft. Spindle is totally enclosed and fitted with precision ball thrust races. Workface of sole plate is grooved to reduce friction. Workhead is balanced and spring loaded so that grinding wheel is clear of work when the tool is not in operation.

Check No. 1 on Reply Card for more Details

Speeds Accurate Machining

Brown & Sharpe Mfg. Co., Providence 1, R. I., is offering a machine for positioning jet engine blades and drilling center holes used for location purposes in subsequent operations. Blade is supported in a nonfrictional mounted cradle arranged to adjustably pivot about two axes and also adjustable vertically. Either of the three movements can be clamped independently without affecting the others. Proper positioning is effected by observation of six strain gage indicator points in contact with the surface.

Indication is obtained from a Brown & Sharpe electronic amplifier. Multiple position switch permits selection of individual gage identification setup purposes. Additional switch positions cause all gages to be interconnected electrically to show individual average indication for the three movements required to bring

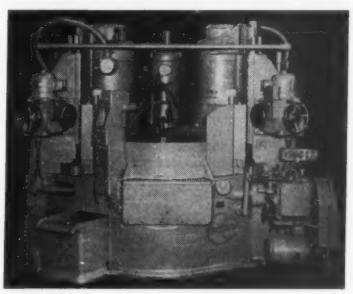


the surface into its proper position. After positioning the blade the switch is operated causing advance of three combination center drill and facing cutters which make three operations on bosses on the blade. Setup is from a master blade. Machine accommodates 17 sizes of blades and operates at the rate of 100 per hour.

Check No. 2 on Reply Card for more Details

Rotary Table Surface Grinder

Multispindle in design is the No. 16A3 vertical spindle rotary table surface grinder manufactured by Blanchard Machine Co., 64 State St., Cambridge 39, Mass. It may be equipped with a 40-inch magnetic chuck or a plain table for holding nonmagnetic work or pieces of irregular shape. Maximum swing of work or fixture is 49 inches. Grinder



is equipped with three abrasive wheels, all of which can be set to grind the same surfaces when stock removal is heavy or accurate tolerances for dimension or surface finish are required.

One spindle may be set to grind a surface at the same or different height, at a different distance from center of chuck. Photograph shows a grinder equipped with two spindles driven by 30 hp motors and one driven by a 15 hp motor. It is equipped with a 24-station fixture arranged for automatic clamping and releasing. All grinding wheels are under the control or an automatic caliper or sizing device which will hold dimensional variation within a total range of 0.001-inch.

Check No. 3 on Reply Card for more Details

Small Parts Plating Unit

Cutting tools and wear parts may have their life multiplied several times through application of an industrial hard chromium plating process using a model A-20 Chromaster plating unit and Chromasol liquid plating solution, both developments of Industrial Chrome Division, Ward Electric Co., Mount Vernon, N. Y. Plating unit provides facilities for hard chrome plating metal surfaces

up to 10 square inches at the recommended current density of 2 amperes per square inch. Unit is compact and portable. Greater capacities will be available at a later date.

Power is furnished by a dry disk selenium rectifier this being part of a complete unit which includes plating bath tank, rheostat timer, ammeter and reversing switch for stripping action. Plating solution is of a noncritical type and is shipped in concentrated form. It delivers a hard chrome plate that follows the exact characteristics of the base metal to which it is applied. Rate of deposition remains constant at 0.002-inch per hour.

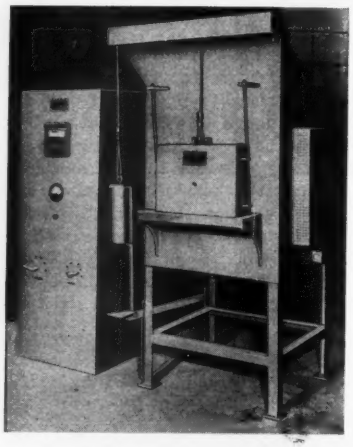
Check No. 4 on Reply Card for more Details

General Purpose Furnaces

Designed for heavy and continuous duty at all heat levels up to 2500° F, with higher temperatures available for short or intermittent runs, is the FG series of electric furnaces with various load capacities offered by Pereny Equipment Co., 893 Chambers Rd., Columbus 12, O.

Each of the furnaces has a separate matching control panel unit with indicating controller, transformer, current input meter with pushbutton reading and magnetic contactor. Choice of standard makes or types of controls (recording, program or cycle, excess temperature, etc.) are also available.

Voltage regulating type transformer with 36 taps on multiple deadfront switches maintains constant heating rate. Maximum connected



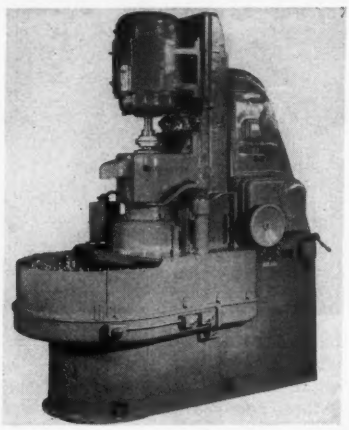
loads of furnaces range from 9 to 50 kw. Loading areas of the several models range from 4 x 8 x 10 to 12 x 16 x 30 inches. Within the work chamber the entire surface of the U-shaped carbide hearth is evenly exposed to the heat.

Check No. 5 on Reply Card for more Details

Close Tolerance Grinders

Mattison Machine Works, Rockford, Ill., is producing the Hanchett type No. 36 grinder, capable of handling a wide variety of work and producing close tolerances on jobs requiring precision finishes. The automatic rotary machines are built in four types. No. 36A is used on work requiring large production and accurate finish where the stock removal is such that it can be taken at one pass under the grinding wheel. Parts are placed directly on a rotary magnetic chuck or work table carrying a group of workholding fixtures. Vertical slide on which the wheel head is mounted has one flat and one V-way, held in alignment by adjustable tapered gibs.

No. 24A is a smaller edition of the No. 36A with the same design and construction features. No. 36-A2 is for use where stock removal is excessive and a high production on a large amount of work is needed, while maintaining close tolerances and accurate finishes. It resembles two No. 36A machines joined together. The additional grinding spindle enables a work base to be completely processed in one pass through the machine. A job can re-



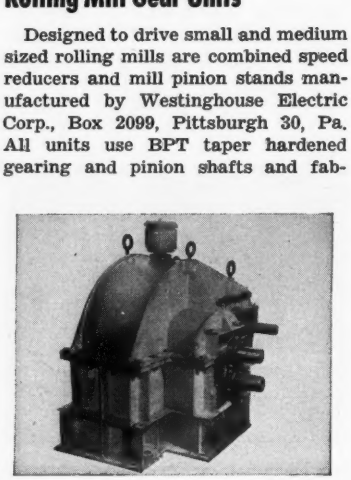
ceive a rough cut on the first spindle, be checked by an automatic sizer, pass under the second spindle for a finished cut and again be checked by an automatic sizer before release.

No. 24-A2 is of the same design as the No. 36-A2, but built on a smaller scale.

Check No. 6 on Reply Card for more Details

Rolling Mill Gear Units

Designed to drive small and medium sized rolling mills are combined speed reducers and mill pinion stands manufactured by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. All units use BPT taper hardened gearing and pinion shafts and fab-



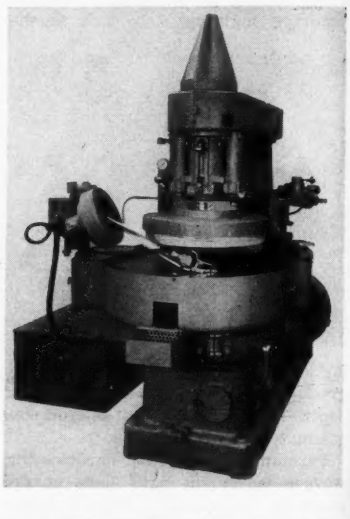
ricated steel housings. These features permit mounting in minimum space.

Gearing is of standard AGMA hobbed helical type with a high helix angle for smooth operations and less vibration at higher speeds, as well as assuring uniform tooth loading and wear. Antifriction bearings are used throughout, with lubrication by a splash or forced feed system as required. Four sizes are available for powering by 25, 50, 100 and 150 hp motors.

Check No. 7 on Reply Card for more Details

Vertical Lapping Machine

Continuously finishing small flat parts and incorporating automatic loading and unloading is the No. 26 Hydrolap vertical lapping machine built by Norton Co., Worcester 6, Mass. Advantages resulting from its



use include no down time except for dressing laps, high production with no sacrifice in accuracy or finish, reduced handling time, unskilled machine operator, a simple work holder which allows for economical replacement when required and an automatic safety device which stops machine if work is improperly loaded.

In upper left of machine illustrated is the hopper containing unfinished parts which rotates and picks them up in slots, machined to allow parts to seat with the raised surface down. Selected washers feed by gravity down the loading chute to the finger loading mechanism. They are directed between rotating abrasive laps in a path which leads from the outer edge of the laps to the inner edge and out again, reducing lap dressing operations to a minimum.

Check No. 8 on Reply Card for more Details

Heavy Duty Electric Hoists

Made in ½, 1, 1½, 2, 3, and 5-ton capacities are Bob-Cat heavy duty electric cable hoists, offered by Cleveland Chain & Mfg. Co., Broadway and Henry Streets, Cleveland 5, O. Motor is totally enclosed within

the cable drum, reducing over-all dimensions and affording weight savings. They are completely protected against moisture, splashing liquids, weather, dust and corrosive atmospheres.

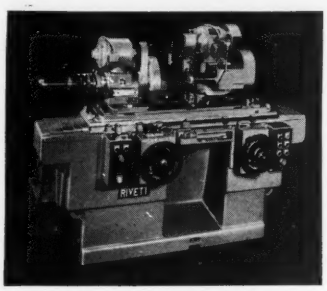
Hoists are powered by high torque motors and gear reduction is by means of a double internal gear train incorporating two Weston-type load brakes. Safety factor is in excess of 6 to 1. Load hook oscillates on

ball bearings and swivels on roller bearings. It is suspended on a 5/16-inch preformed plow steel cable. Operation may be on 220, 380, 440, or 550-v 3-phase, 60-cycle current with either pendant rope or pushbutton control on pendant cable.

Check No. 9 on Reply Card for more Details

Grinder Eliminates Setup

Designed to eliminate dual work setups for internal and external grinding is the model 1024 hydraulic grinder offered by Rivett Lathe & Grinder Inc., Boston 55, Mass. Wheel-



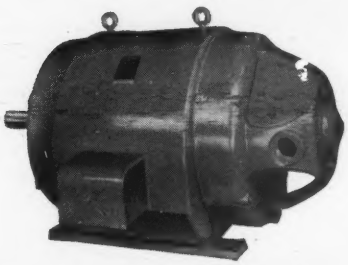
head swivels 180 degrees and mounts internal and external spindles. It is built to perform all types of grinding, including small, large and deep-hole internal grinding and straight and long shaft, diameter and shoulder external grinding.

Internal spindle speeds are from 6000 to 35,000 rpm. All spindles are flange mounted, sealed from grit and life lubricated. External spindle has several roll roller bearings for radial load and ball bearings for end thrust. Other features include micrometer table stop and fine feed for shoulder and blind-hole grinding, sine bar for setting workhead on table swivel and all grinding wheel feed controls at operator's right hand.

Check No. 10 on Reply Card for more Details

Variable Speed Motors

Electric Machinery Mfg. Co., Minneapolis 13, Minn., has developed a line of heavy duty wound rotor induction motors for applications requiring variable speed drives, high starting torque and low starting current or long acceleration periods. They are built in ratings from 30 to 1500 hp and are of drip-proof construction. Splash-proof or enclosed forced-ventilation models are also available. Fabricated steel frame



features high physical impact strength and crack-proof steel bar feet.

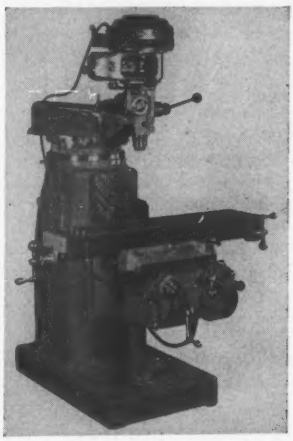
Motors are available with either ball or split-sleeve type bearings and are easily accessible for inspection and maintenance. Brush pressure is easily adjusted with a ratchet wheel brush tension adjuster providing metered increase or decrease of pressure on individual brushes.

Check No. 11 on Reply Card for more Details

Miller Features Versatility

Movement of the vertical head up to and including 45 degrees across the table each way from a vertical position is incorporated in the model 2 UV universal vertical milling machine built by Tree Tool & Die Works, Racine, Wis. It is capable of angle milling, drilling and boring. Vertical head movement permits angle milling cuts the length of the longitudinal table feed without resetting. Head can also be rotated in a plane parallel with the table axis 90 degrees each way.

A 1 hp axial air-gap motor powers the spindle at speeds from 140 to 3500 rpm or from 210 to 5200 rpm. Head capacity is from ⅛ to 1½-inch end mills. It is mounted on a dovetail type ram enabling moving the spindle to any position perpendicular to the table without realigning after moving. Automatic collet closing mechanism is incorporated. Feeds of



¾, 1⅜, 2⅜, 4 and 7 inches per minute and the rapid traverse of 70 inches per minute are incorporated in the table movement.

Check No. 12 on Reply Card for more Details

Sweeper Drives Like Car

Capable of sweeping up to 43,500 sq ft per hour at speeds up to 8 mph is the model 24 power sweeper designed by G. H. Tennant Co., 2530 N. Second St., Minneapolis 11, Minn. Driven like an automobile, it has a 4.4 hp air-cooled gasoline engine, automatic clutch and reverse gear. Because it is only 29 inches wide, it will clean narrow aisles. A two-speed transmission allows a speed as low as 2 mph in congested areas. Vacuum system of the unit draws flying dust from cracks and crevices and deposits it in a fabric bag. A 24-inch brush moves soilage into an easy-to-dump hopper.

Check No. 13 on Reply Card for more Details

Drill Press—Contour Grinder

Mounting on any drill press column is a contour grinder attachment built by George F. Grant Co. Inc., 24 Kempton Place, West Newton, Mass. Swinging out of the way when not in use, the contour grinder uses a standard 2½ x 60-inch belt. Concave or convex parts and radii may be ground, and deburring and shaping performed.

Change of belt ratio or spindle

speed provides speed ranges from 7000 to 36,000 rpm (700 to 4500 feet of abrasive per minute). A special interchangeable spindle attachment provides continuous reel form or cylindrical grinding. Felt wheel blanks may be shaped to meet varying requirements. Special equipment includes a spindle grinding attachment using ⅜ to 2-inch diameter abrasive sleeves for internal surfaces.

Check No. 14 on Reply Card for more Details

• • •

MAKES SPRINGS: A new model hand-operated spring coiling machine for making compression, extension and torsion springs is available from the Carlson Co., New York 7, N. Y. About 300 precision springs exactly alike can be wound per hour. Springs can be made with outside diameters up to ⅞-inch with overall lengths up to 4 inches using wire diameters from 0.005-inch to 0.065-inch.

Check No. 15 on Reply Card for more Details

FOR PRODUCTION WELDING: Designed for heavy duty, round-the-clock production welding is the new 80 series of industrial alternating current arc welders, announced by Marquette Mfg. Co., Minneapolis, Minn. One feature is the use of Hipersil steel transformer cores which are claimed to provide one-third greater flux-carrying capacity, reducing power consumption and operating costs. Welders are available in 200, 300 and 400 amp capacities.

Check No. 16 on Reply Card for more Details

SAFETY FOR OPERATOR: A new, improved, streamlined vertical mill attachment is introduced by Marvin Machine Products Inc., Detroit 26, Mich. Safety for the operator is provided by a protecting hood over the power transmission parts.

Check No. 17 on Reply Card for more Details

PRESSURE REDUCING VALVE: Hydreco VA series, a new type of plunger operated pressure reducing valve, is introduced by Hydraulic Equipment Co., Cleveland 17, O. Valve is designed for reducing line pressure in oil-hydraulic control systems so that individual hydraulic units may be operated with reduced pressure without changing normal system pressure.

Check No. 18 on Reply Card for more Details

UTILITY GRINDER: Lima Electric Motor Co., Lima, O., announces a new 6-inch model A deluxe utility grinder. It features dynamically balanced rotors, integrally cast wheel guards, adjustable tool rests and fast grinding, long wearing abrasive wheels. It has a ¼-hp, 3450 rpm motor of dust proof construction, single phase, ac, 60 cycle, 115 or 230 v (single voltage only). It is also available for 2 or 3 phase, ac, 60 cycle, 220 or 440 v.

Check No. 19 on Reply Card for more Details

CONTROLS HUMIDITY: Powered with a ½-hp hermetically sealed Freon condensing unit, the new dehumidifier 50, offered by Walter Haertel Co., Minneapolis, Minn., has a maximum 24-hour capacity of 50 pounds of water removal from the air.

Check No. 20 on Reply Card for more Details

FOR CORROSION PROOFING: Prufcoat Laboratories Inc., Cambridge, Mass., offer metal reactive primer P-10, a metal treating formulation that provides a two-step system for corrosion proofing old or moist metal surfaces. It does not require complete surface cleaning and works well on damp or dry surfaces. The coating can be applied by brush or spray.

Check No. 21 on Reply Card for more Details

GOGGLE PLATE VALVE: Edgar E. Brosius Co. Inc., Pittsburgh, Pa., announces the new Westling goggle plate valve, which allows fast positive mechanical operation with new protection against leakage. This cut-off valve can be opened and closed by one man in from ½ to 3 minutes depending upon size. It can be operated manually or can be motor driven and interlocked.

Check No. 22 on Reply Card for more Details

BALL-BEARING CENTER: No. 1490 ball bearing center, made by Delta Power Tool Division, Milwaukee 1, Wis., has a double row of sealed, lubricated-for-life ball bearings to take heavy radial and thrust loads. It is designed for use on lathes, grinders, screw machines, gear hoppers, etc.

Check No. 23 on Reply Card for more Details

TO MEASURE UP: No. 530 series of precision case-type steel tapes is announced by L. S. Starrett Co., Athol, Mass. Tapes are ⅜-inch wide and accurately etched with bright steel graduations on a no-glare black background. They are available in 25, 50, 75 and 100-foot lengths.

Check No. 24 on Reply Card for more Details

STAINLESS STEEL BELLOWS: Hydraulically formed stainless steel bellows in a wide range of sizes from 7/16 to 26⅜-inch diameter are available from Clifford Mfg. Co., Waltham, Mass. They are recommended for applications involving control of temperature and pressure, shaft sealing, steam traps, providing flexible joints for instruments which combine rotary motion and hermetic seal and transmission of movement hydraulically to remote parts.

Check No. 25 on Reply Card for more Details

BOLT CUTTER: With a capacity equal to that of a standard 18-inch cutter, a new 15-inch bolt cutter is introduced by Manco Mfg. Co., Bradley, Ill. The formed steel handles will not yield under pressure. Jaws are easily replaceable and resharpened when required.

Check No. 26 on Reply Card for more Details

PROTECTIVE COATINGS: Two new synthetic rubber coatings are available from Carboline Co., St. Louis 5, Mo. Chlorclad M-4 is for use on metal and concrete for long life under corrosive conditions. W-6 is for use on wood subjected to continual immersion in water or for very moist conditions. Both adhere to all surfaces and old paints without the use of a primer or meticulous surface preparation.

Check No. 27 on Reply Card for more Details

FLOATING ANCHOR NUT: Plate-Lok floating anchor nut, made by Boots Aircraft Nut Corp., Stamford, Conn., incorporates the Plate-Lok nut in light compact, floating anchor base. Bases are steel, stainless steel, or aluminum alloy and are available in a variety of styles to suit method of attachment that is to be made.

Check No. 28 on Reply Card for more Details

T-SLOT CUTTERS: Reltool Corp., Milwaukee 46, Wis., offers T-slot cutters with straight shanks for use in the company's and other standard holders. Greater side chip clearance that results in free cutting action and less breakage is a feature of the cutters.

Check No. 29 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

74. Hoists & Cranes

Northern Engineering Works—8-page illustrated form E-312 presents various types of Hi-Lift hoists and cranes in capacities up to 15 tons. Close-up and subassembly views show details of design and construction. Tabulated dimension data for different capacities and spans for hoist cranes and end trucks are included.

75. Shapers

Cincinnati Shaper Co.—32-page illustrated catalog N-5 is guide to line of 25 shapers available in ten sizes and five types. Plain table, universal, utility, high-speed and special shapers are discussed and applications of each depicted.

76. Self-Locking Set Screw

Set Screw & Mfg. Co.—Heavy cardboard "Zip-Grip Self-locking Set Screw" demonstrator portrays contra-thrust action and interference fit accomplished by this fastener. Comparative action of self-locking type with standard set screw is shown and explained.

77. Cut-Off Wheels

Raybestos-Manhattan, Inc., Manhattan Rubber Div.—6-page illustrated bulletin 6888C lists wheel grade recommendations and cutting performance data as well as operating suggestions for Delta cut-off machines.

78. Conveyor Belts

B. F. Goodrich Co.—26-page illustrated catalog section depicts and describes Cord, hot and cold material, oil service, package, food handling, grain and industrial conveyor and elevator belts. Construction of each type is explained and significant application data presented.

79. Metal Inspection Method

Dy-Check Co.—4-page illustrated bulletin 500 describes dye-penetrant method of metal inspection and shows how this chemical process facilitates nondestructive testing. Dip, brush and spray methods are shown, and typical applications in factories and in the field are covered.

80. Surface Grinders

Mattison Machine Works—8-page illustrated bulletin 847-2RM depicts and describes reciprocating table models 200A, 300, 400 and 400SS Hanchett type production surface grinders for accurate generation of flat surfaces. Machines are suitable for grinding knife and shear blades, and surfacing machine parts, die blocks, gear racks and small tools.

81. Industrial Refrigerators

Bowser, Inc., Bowser Technical Refrigeration Div.—4-page illustrated bulletin T-1150 presents full specifications on new T-series refrigeration units which are designed for low-temperature testing, storage and processing. Models are available for operating ranges of —20 to —60° F down to —90 to —150° F. Thermal properties of various materials are listed.

82. Blast Cleaning

American Wheelabrator & Equipment Corp.—8-page illustrated bulletin No. 454 explains advantages of continuous airless abrasive blast cleaning and cites actual production figures for five sizes of Continuous Tumblasts.

83. Steel Stock List

Central Steel & Wire Co.—360-page illustrated "1951-52 Stock List" covers various structural steel shapes including beams, channels, angles, tees, zees and plates; hot rolled bars and strips; strip flat wire spring steel; brass and copper alloys; stainless steel and tubing; and wire nails, bolts, rivets and washers.

84. Emulsion Cleaners

Detrex Corp.—Illustrated folder describes series of emulsion cleaners which have been designed to remove both oil-soluble and water-soluble soils from any metal or alloy without attacking base metal or harming most paint finishes.

85. Plastic Molding

M. W. Kellogg Co., Chemical Mfg. Div.—8-page illustrated technical bulletin 3-10-50 P.1 is entitled "Molding Techniques." Presented is general information and property data on Kel-F plastic. Procedures for molding sheets without dies; compression, extrusion and transfer molding; and for other processes are covered in detail.

86. Low Temperature Welding

Eutectic Welding Alloys Corp.—48-page illustrated "Manual of Welding Engineering and Design" discusses use of Low Temperature welding alloys and fluxes in fabricating and assembling operations for national defense products. Characteristics, properties, applications and operating precedures for each alloy and flux are given.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

4c POSTAGE WILL BE PAID BY—

STEEL
Penton Building
CLEVELAND 13, OHIO

Readers' Service Dept.

STEEL Numbers				
1	21	41	61	81
2	22	42	62	82
3	23	43	63	83
4	24	44	64	84
5	25	45	65	85
6	26	46	66	86
7	27	47	67	87
8	28	48	68	88
9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

STEEL 1-8-51
Penton Building, Cleveland 13, Ohio

Please send ☐ Literature ☐ Price information ☐ Nearest source of supply on the items circled at the left.

NAME TITLE

COMPANY

PRODUCTS MANUFACTURED

ADDRESS

CITY and ZONE STATE

This card MUST be completely filled in. Please TYPE or PRINT

DEPARTMENT OF TECHNOLOGY
BUFFALO PUBLIC LIBRARY

87. Induction Motors

Allis-Chalmers Mfg. Co.—6-page illustrated bulletin No. 05B7550 is descriptive of standard 40° C rise continuous rated two-pole 60-cycle 3600-rpm bracket bearing squirrel-cage motors for direct-connected drives in all ratings 900 hp and larger. Motors are suitable for boiler feed pumps, oil pipeline service, centrifugal blowers and descaling pumps.

88. Fluid Pressure Booster

Miller Motor Co.—12-page illustrated bulletin B-200 describes fluid pressure booster which has input range of 40 to 3000 psi air of fluid and develops output of 200 to 10,000 psi fluid pressure. Application and engineering data are given. Also covered are booster-accumulators for output pressures of 3000 psi and higher.

89. Hydraulic Cylinders

Logansport Machine Co.—28-page illustrated catalog No. 200, Section 2, lists various types of Rotocast hydraulic cylinders available in rabbeted, foot, trunnion, center-line, flange at blind end, flange at rod end and clevis mounting styles. They are suitable for pushing, pulling, lifting or holding operations.

90. Steel Bar Stock

A. Milne & Co.—4-page illustrated bulletin AM-100 is descriptive of steel barstock cold-drawn in special sections to fit specific purposes. Preshaped feature eliminates many machining operations in production of steel parts.

91. Dust Collectors

Buell Engineering Co.—4-page illustrated bulletin "Electric Precipitators" demonstrates how these units are employed for collection and recovery of ultrafine dusts as well as removal of fumes and mists. Electronic in operation, this equipment is engineered for all types of applications.

92. Alloys & Fluxes

All-State Welding Alloys Co.—32-page illustrated pocket-size "Buyers Guide" tells how to select alloys and fluxes for welding, brazing, soldering, cutting and tinning.

93. Universal Joints

Curtis Universal Joint Co. —4-page illustrated bulletin C1 tells how to select universal joints according to various load conditions and required safety factors. Also presented are performance curves and purchasing and engineering data.

94. Electronic Relay

Minneapolis-Honeywell Regulator Co., Brown Instruments Div.—4-page illustrated specification sheet No. 194 describes Electr-O-Line position-proportioning relay equipped with automatic reset. It is used with indicating or recording proportioning electric controllers and is suitable for operation with any standard electric proportioning motor.

95. Pressure-Cell Equipment

Electronic Associates, Ltd.—8-page illustrated bulletin SA 5-9-50 deals with measuring true dynamic air pressures with Sierra flush-mounted pressure-cell equipment. Cells are pressure pickups designed to mount directly into aircraft skin or other surface to measure pressure at point of application.

96. Air Piping System

Fluor Corp. Ltd.—4-page illustrated bulletin PDS-8501 explains operation of Fluor pulsation-dampening piping systems which assure pulse-free delivery of all types of compressed gas. Operating principle of this prefabricated piping system is explained.

97. X-Ray Photometer

General Electric Co.—8-page illustrated bulletin GEC-412A lists industrial applications for x-ray photometer in petroleum and chemical fields. Instrument is designed to obtain chemical analyses by x-ray absorption, and bulletin explains operating procedure and describes principal components.

98. Cranes

American Hoist & Derrick Co.—24-page illustrated catalog No. 400-R-2 deals with use of Revolver cranes in heavy industry. Shown are typical installations at several large construction projects. Rated lifting capacities of cranes range up to 75 tons at 70-ft radius.

99. Seamless Tubing

Globe Steel Tubes Co.—4-page illustrated bulletin "Globeiron" outlines advantages of this corrosion-resistant easily-fabricated seamless pressure tubing which is made of high-purity ingot iron. Properties, analyses and applications are discussed.

100. Precision Castings

Alloy Precision Castings Co.—8-page illustrated brochure "The Ultimate in Precision Castings" is devoted to engineering, metallurgical and other aspects of Mercast process of producing precision castings. Step-by-step procedures in making typical parts are shown pictorially. Castings are produced in wide range of ferrous and nonferrous metals.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

STEEL Numbers				
1	21	41	61	81
2	22	42	62	82
3	23	43	63	83
4	24	44	64	84
5	25	45	65	85
6	26	46	66	86
7	27	47	67	87
8	28	48	68	88
9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

STEEL 1-8-51
Penton Building, Cleveland 13, Ohio

Please send ☐ Literature ☐ Price information ☐ Nearest source of supply on the items circled at the left.

NAME TITLE

COMPANY

PRODUCTS MANUFACTURED

ADDRESS

CITY and ZONE STATE

This card MUST be completely filled in. Please TYPE or PRINT

DEPARTMENT OF TECHNOLOGY
BUFFALO PUBLIC LIBRARY

FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L. &R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

4c POSTAGE WILL BE PAID BY—

STEEL
Penton Building
CLEVELAND 13, OHIO

Readers' Service Dept.

The Market Outlook

MANUFACTURERS of civilian goods are beginning to cut back operations under impact of steel and nonferrous metal shortages. Some metalworking shops already have curtailed. Others plan to do so shortly as the shift to a defense economy accelerates. But cutbacks to date provide only a foretaste of things to come. Much sharper contraction in hard goods manufacturing looms in the weeks ahead as government curbs on end uses of metal go into effect. Plant shutdowns and accompanying unemployment appear certain before end of the current quarter.

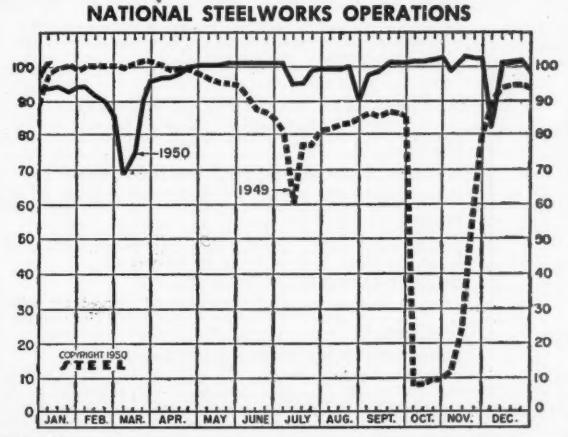
DEFENSE BUYING— Extent of slackening in general metalworking will depend largely, but not entirely, on the speed with which defense orders are placed. It will take manufacturers time to adjust to new production routines even after they obtain defense orders. In the main, however, it is believed dislocations will be short-lived. More than $3 billion worth of vehicles and spare parts have been ordered by the Ordnance Corps alone since last July, items ranging from medium tanks to radiator caps. Nearly one-third of this business went to small manufacturers. In addition hundreds of subcontractors are participating in the work. With the government program of controls and scheduling for the emergency being rounded into shape it is believed defense work will relatively quickly take up the slack in industry once the armament programs get into full swing.

SUPPLY— Progressively tight steel supply conditions are indicated through the first half of the new year. But chief immediate concern of general manufacturing industry centers on the nonferrous metals. Heavy general use, allocations to defense, and government stockpiling are playing havoc with supplies of these metals. The outlook in copper is particularly distressing at the moment. Effective Mar. 1 use of the red metal is banned in 300 civilian products.

PRODUCTS— Far extended delivery promises on fabricated steel are discouraging builders from going ahead with plans for various projects. Building steel is in growing scarcity, and more heavy steel items are scheduled to be diverted from commercial channels for the building of defense plants, including steel expansions. It is estimated the U. S. Steel Corp.'s project at Morrisville, Pa., alone will require 125,000 tons of structurals and 8000 tons of steel piling, not to mention huge tonnages of reinforcing steel, pipe and miscellaneous products. Fabricators are experiencing further cuts in their allocations of plates and shapes. Some plate producers will have less tonnage available for the general trade in March than they had in February despite the fact more plates will be coming from continuous sheet mills by that time. Non-rated consumers of sheets and strip are reconciled to further cuts in their allotments for March.

PRICES— Clarification of the status of steel prices under the government's rollback order is still awaited. Scrap price discussions were held in Washington last week, but no final decisions were reached. Reports in the trade were to the effect a rollback of No. 1 heavy melting steel to $45 Pittsburgh is possible, with unprepared scrap taking a $6 per ton differential under the major grades. Some trade authorities think it will be another 30 days at least before the price issue is settled. Meanwhile, prices are steady at recently established levels. STEEL's weighted index on finished steel holds at 167.89 as does the arithmetical composite at $103.50, and steelmaking scrap at $45.50. The pig iron composites also are unchanged with No. 2 foundry, $52.54, basic, $52.16, and malleable, $53.27.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Jan. 6	Change	Same Week 1950	Same Week 1949
Pittsburgh	97.5	— 0.5*	97	96
Chicago	101.5	+ 1.5*	97.5	99
Eastern Pa.	100	+ 9	86	95
Youngstown	106	0	102	105
Wheeling	96	— 1	101.5	90
Cleveland	101	+ 6.5*	98.5	94.5
Buffalo	104	0	103.5	104
Birmingham	100	0	100	100
New England	83	— 6	80	85
Cincinnati	97	+ 9	106	99
St. Louis	87.5	+ 6*	89	84.5
Detroit	106	+ 2.5*	109	99
Western	92.5	— 3.5*	83	..
Estimated national rate	101	+ 3	93.5	97.5

Based on weekly steelmaking capacity of 1,928,721 net tons for 1951 and second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949; 1,802,476 tons for 1948.

* Change from revised rate.

The Metalworking Outlook—p. 17 *Production-Engineering News—p. 53*

Composite Market Averages

	Jan. 4 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)..	167.89	167.89*	167.76	156.13	101.87
Index in cents per lb.	4.548	4.548*	4.545	4.230	2.760
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT.....	$103.50	$103.50	$100.53	$92.72	$58.27
No. 2 Fdry, Pig Iron, GT..	52.54	52.54	52.54	46.10	25.42
Basic Pig Iron, GT	52.16	52.16	52.04	45.60	24.75
Malleable Pig Iron, GT....	53.27	53.27	53.27	47.27	26.04
Steelmaking Scrap, GT ...	45.50	45.50	45.50	26.83	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39. Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown, Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Jan. 4 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh....	3.70	3.70	3.70	3.45	2.25
Bars, H.R., Chicago.....	3.70	3.70	3.70	3.45	2.25
Bars, H.R., del. Philadelphia	4.18	4.18	4.18	3.93	2.57
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10–15	2.75
Shapes, Std., Pittsburgh ..	3.65	3.65	3.65	3.40	2.10
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.10
Shapes, del. Philadelphia..	3.90	3.90	3.90	3.46	2.215
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.25
Plates, Chicago	3.70	3.70	3.70	3.50	2.25
Plates, Coatesville, Pa. ...	4.15	4.15	4.15	3.60	2.25
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.25
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.25
Sheets, H.R., Pittsburgh...	3.60–75	3.60–75	3.60–75	3.35	2.20
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.20
Sheets, C.R., Pittsburgh...	4.35	4.35	4.35	4.10	3.05
Sheets, C.R., Chicago	4.35	4.35	4.35	4.00	3.05
Sheets, C.R., Detroit	4.55	4.55	4.30	4.20	3.15
Sheets, Galv., Pittsburgh..	4.80	4.80	4.80	4.40	3.70
Strip, H.R., Pittsburgh...3.75–4.00		3.75–4.00	3.75–4.00	3.25	2.10
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.10
Strip, C.R., Pittsburgh ...4.65–5.35		4.65–5.35	4.65–5.25	4.15	2.80
Strip, C.R., Chicago.....4.50–90		4.50–90	4.30–90	4.00–15	2.90
Strip, C.R., Detroit 4.35–5.60		4.35–5.60	4.35–5.60	4.20–40	2.90
Wire, Basic, Pittsburgh ..4.85–5.10		4.85–5.10	4.85–5.10	4.50	2.75
Nails, Wire, Pittsburgh...5.90–6.20		5.90–6.20	5.90–6.20	5.30	2.90
Tin plate, box, Pittsburgh.	$8.70	$7.50	$7.50	$7.50	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$66.00	$66.00	$66.00	$63.00	$42.00
Wire rods, ⅞-⅜", Pitts....	4.10–30	4.10–30	4.10–30	3.85	2.15

PIG IRON, Gross Ton

Bessemer, Pitts. $53.00	$53.00	$53.00	$47.00	$26.25
Basic, Valley 52.00	52.00	52.00	46.00	25.25
Basic, del. Phila. 56.39	56.39	56.39	49.44	27.09
No. 2 Fdry, Pitts. 52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Chicago 52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Valley 52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Del. Phila. ... 56.89	56.89	56.89	49.94	27.59
No. 2 Fdry, Birm. 48.88	48.88	48.88	39.38	22.13
No. 2 Fdry (Birm.) del. Cin. 55.58	55.58	55.58	46.08	25.81
Malleable Valley 52.50	52.50	52.50	46.50	25.75
Malleable, Chicago 52.50	52.50	52.50	46.50	25.75
Charcoal, Lyles, Tenn. 66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts...$46.50	$46.50	$46.50	$30.00	$20.00
No. 1 Heavy Melt. E. Pa.. 45.00	45.00	45.00	23.50	18.75
No. 1 Heavy Melt. Chicago 45.00	45.00	45.00	27.00	18.75
No. 1 Heavy Melt. Valley.. 46.25	46.25	46.25	30.25	20.00
No. 1 Heavy Melt. Cleve.. 45.75	45.75	45.75	27.25	19.50
No. 1 Heavy Melt. Buffalo. 44.88	44.88	41.50	27.75	19.25
Rails, Rerolling, Chicago.. 67.00	67.00	65.50	39.50	22.25
No. 1 Cast, Chicago 63.00	63.00	62.00	38.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl...$14.75	$14.75	$14.25	$13.25	$7.50
Beehive, Fdry., Connlsvl... 17.50	17.50	16.50	15.50	8.25
Oven Fdry., Chicago 21.00	21.00	21.00	20.00	13.00

NONFERROUS METALS

Copper, del. Conn. 24.50	24.50	24.50	18.50	12.00
Zinc, E. St. Louis 17.50	17.50	17.50	9.75–10.00	8.25
Lead, St. Louis 16.80	16.80	16.80	11.80	6.35
Tin, New York.....157.00	151.00	140.00	77.50	52.00
Aluminum, del. 19.00	19.00	19.00	17.00	15.00
Antimony, Laredo, Tex. .. 32.00	32.00	32.00	32.00	14.50
Nickel, refinery, duty paid. 50.50	50.50	48.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn,N.Y.,del.	....	58.79	59.29	....
Newark,del.	56.63	57.13	57.63	58.13
Philadelphia,del.	56.39	56.89	57.39	57.89
Birmingham District				
AlabamaCity,Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward,Ala. W15	48.38	48.88	....	....
Cincinnati,del.	....	55.58	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda,N.Y., W12	52.00	52.50	53.00	....
No.Tonawanda,N.Y., T9	....	52.50	53.00	....
Boston,del.	61.26	61.76	62.20	....
Rochester,N.Y., del.	54.63	55.13	55.63	....
Syracuse,N.Y.,del.	55.58	56.08	56.58	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary,Ind. U5	52.00	....	52.50	....
IndianaHarbor,Ind. I-2	52.00	....	52.50	....
So.Chicago,Ill. W14	52.00	52.50	52.50	....
So.Chicago,Ill., Y1	52.00	52.50	52.50	....
So.Chicago,Ill. U5	52.00	....	52.50	53.00
Milwaukee,del.	53.89	54.39	54.39	54.89
Muskegon,Mich.,del.	....	57.98	57.98	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.39	54.89	54.89	54.39
Lorain,O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie,Pa. I-3	52.00	52.50	52.50	53.00
Everett,Mass. E1	....	53.25	53.75	....
Fontana,Calif. K1	58.00	58.50	....	....
Geneva,Utah G1	52.00	52.50	....	....
Seattle,Tacoma,Wash.,del.	....	60.20	....	....
Portland,Oreg.,del.	....	60.20	....	....
LosAngeles,SanFrancisco,del.	59.70	60.20	....	....
GraniteCity,Ill. M10	53.90	54.40	54.90	....
St.Louis,del. (inc. tax)	54.65	55.15	55.65	....
Ironton,Utah C11	52.00	52.50	....	....
LoneStar,Tex. L6	48.00	*48.50	48.50	....
Minnequa,Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	....	52.50	52.50	53.00
Pitts.,N&S. sides, Ambridge, Aliquippa,del.	....	53.69	53.69	54.19
McKeesRocks,del.	....	53.45	53.45	53.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	....	53.94	53.94	54.44
Verona,del.	....	54.40	54.40	54.90
Brackenridge,del.	....	54.63	54.63	55.13
Bessemer,Pa. U5	52.00	....	52.50	53.00
Clairton,Rankin,So.Duquesne,Pa. U5	52.00	....	....	....
McKeesport,Pa. N3	52.00	....	....	53.00
Monessen,Pa. P7	54.00	....	....	....
Sharpsville,Pa. S6	....	....	52.50	53.00
Steelton,Pa. B2	54.00	54.50	55.00	55.50
Swedeland,Pa. A3	56.00	56.50	57.00	57.50
Toledo,O. I-3	52.00	52.50	52.50	53.00
Cincinnati,del.	57.01	57.51	....	....
Troy,N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard,O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Mansfield,O.,del.	56.26	56.76	56.76	57.26

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson,O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls,N.Y. P15	$83.00
Keokuk,Iowa, Openhearth & Fdry, frt, allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb. piglets, 16% Si, frt. allowed K2	95.50
Wenatchee,Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton,Pa. B2	60.00
Philadelphia delivered	63.00
Troy,N.Y. R2	60.00

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

Semifinished and Finished Steel Products

Mill prices as reported to STEEL Jan. 4, 1951; cents per pound except as otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Fontana,Calif. K1 ....$9.00
Munhall,Pa. U5 .....52.00

INGOTS, Alloy (NT)
Detroit R7 .....$54.00
Fontana, Calif. K1 ....80.00
Houston,Tex. S5 .....62.00
Midland,Pa. C18 .....54.00
Munhall,Pa. U5 .....54.00
So.Duquesne,Pa. U5 ..54.00

BILLETS, BLOOMS & Slabs Carbon, Rerolling (NT)
Bessemer,Pa. U5 ....$56.00
Clairton,Pa. U5 .....56.00
Ensley,Ala. T2 .....56.00
Fairfield,Ala. T2 .....56.00
Fontana,Calif. K1 ....75.00
Gary,Ind. U5 .....56.00
Johnstown,Pa. B2 ....56.00
Lackawanna,N.Y. B2 ..56.00
Munhall,Pa. U5 .....56.00
So.Chicago,Ill. U5 ....56.00
So.Duquesne,Pa. U5 ..56.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$66.00
Buffalo R2 .....66.00
Canton,O. R2 .....66.00
Clairton,Pa. U5 .....66.00
Cleveland R2 .....66.00
Conshohocken,Pa. A3 ..73.00
Detroit R7 .....69.00
Ensley,Ala. T2 .....66.00
Fairfield,Ala. T2 .....66.00
Fontana,Calif. K1 ....85.00
Gary,Ind. U5 .....66.00
Geneva,Utah G1 .....66.00
Houston,Tex. S5 .....74.00
Johnstown,Pa. B2 ....66.00
Lackawanna,N.Y. B2 ..66.00
LosAngeles B3 .....85.00
Munhall,Pa. U5 .....66.00
Seattle B3 .....85.00
So.Chicago R2, U5 ....66.00
So.Chicago W14 .....63.00
So.Duquesne,Pa. U5 ..66.00
So.SanFrancisco B3 ..85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ....$70.00
Buffalo R2 .....70.00
Canton,O. R2 .....70.00
Canton,O.(29) T7 ....66.00
Conshohocken,Pa. A3 ..77.00
Detroit R7 .....73.00
Fontana,Calif. K1 .....89.00
Gary,Ind. U5 .....70.00
Houston,Tex. S5 .....78.00
Ind.Harbor,Ind. Y1 ....66.00
Johnstown,Pa. B2 ....70.00
Lackawanna,N.Y. B2..70.00
LosAngeles B3 .....90.00
Massillon,O. R2 .....70.00
Midland,Pa. C18 .....70.00
Munhall,Pa. U5 .....70.00
So.Chicago R2, U5 ....70.00
So.Chicago W14 .....66.00
So.Duquesne,Pa. U5 ...70.00
Warren,O. C17 .....70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 .....$82.00
Cleveland R2 .....82.00
Fontana,Calif. K1 .....103.00
Gary,Ind. U5 .....82.00
Massillon,O. R2 .....82.00
So.Chicago,Ill. R2 .....82.00
So.Duquesne,Pa. U5 ...82.00

SHEET BARS (NT)
Fontana,Calif. K1 ...$89.00

SKELP
Aliquippa,Pa. J5 .....3.45
Munhall,Pa. U5 .....3.35
Warren,O. R2 .....3.35
Youngstown R2, U5 ...3.35

WIRE RODS
AlabamaCity,Ala. R2 ..4.10
Buffalo W12 .....4.10
Cleveland A7 .....4.10
Donora,Pa. A7 .....4.10
Fairfield,Ala. T2 .....4.10
Fontana,Calif. K1 .....4.90
Houston,Tex. S5 .....4.50
Johnstown,Pa. B2 .....4.10
Joliet,Ill. A7 .....4.10
LosAngeles B3 .....4.90
Minnequa,Colo. C10 ....4.35
Monessen,Pa. P7 .....4.30
No.Tonawanda,N.Y.B11 4.10
Pittsburg,Calif. C11 ....4.75
Portsmouth,O. P12 ....4.30
Roebling,N.J. R5 .....4.20
So.Chicago,Ill. R2 ....4.10
SparrowsPoint,Md. B2..4.20
Sterling,Ill.(1) N15 ....4.10
Struthers,O. Y1 .....4.10
Torrance,Calif. C11 ....4.90
Worcester A7 .....4.40

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.65
Bessemer,Ala. T2 .....3.65
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fairfield,Ala. T2 .....3.65
Fontana,Calif. K1 .....4.25
Gary,Ind. U5 .....3.65
Geneva,Utah G1 .....3.65
Houston,Tex. S5 .....4.05
Ind.Harbor,Ind. I-2 ....3.65
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.25
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.25
Minnequa,Colo. C10 ....4.10
Munhall,Pa. U5 .....3.65
Niles,Calif.(22) P1 ....4.85
Phoenixville,Pa. P4 ....4.95
Portland,Oreg. O4 .....4.50
Seattle B3 .....4.30
So.Chicago,Ill. U5, W14 3.65
So.SanFrancisco B3 ....4.20
Torrance,Calif. C11 ....4.25
Weirton,W.Va. W6 .....3.90

Alloy Stand. Shapes
Clairton,Pa. U5 .....4.35
Fontana,Calif. K1 ....5.55
Munhall,Pa. U5 .....4.35
So.Chicago,Ill. U5 .....4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 .....5.50
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa.(14) B2 ..5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.10
Gary,Ind. U5 .....5.50
Geneva,Utah G1 .....5.50
Ind.Harbor,Ind. I-2 ....5.50
Ind.Harbor,Ind. Y1 ....6.00
Johnstown,Pa. B2 .....5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 .....6.05
Munhall,Pa. U5 .....5.50
Seattle B3 .....6.10
So.Chicago,Ill. U5 .....5.50
So.SanFrancisco B3 ....6.00
Struthers,O. Y1 .....6.00

Wide Flange
Bethlehem,Pa. B2 .....3.70
Fontana,Calif. K1 .....4.65
Lackawanna,N.Y. B2 ...3.70
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 .....5.50
Lackawanna,N.Y. B2 ...5.50
Munhall,Pa. U5 .....5.45
So.Chicago,Ill. U5 .....5.45

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ....4.45
Lackawanna,N.Y. B2 ....4.45
Munhall,Pa. U5 .....4.45
So.Chicago,Ill. U5 .....4.45

BEARING PILES
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.65
Bessemer,Ala. T2 .....5.65
Clairton,Pa. U5 .....5.65
Cleveland J5, R2 .....5.65
Conshohocken,Pa. A3 ..5.90
Ecorse,Mich. G5 .....5.85
Fairfield,Ala. T2 .....5.65
Fontana,Calif.(30) K1 ..6.25
Gary,Ind. U5 .....5.65
Geneva,Utah G1 .....5.65
Ind.Harbor,Ind. I-2 ....5.65
Ind.Harbor,Ind. Y1 ....6.15
Johnstown,Pa. B2 .....5.65
Munhall,Pa. U5 .....5.65
Pittsburgh J5 .....5.65
Seattle B3 .....6.55
Sharon,Pa. S3 .....5.70
So.Chicago,Ill. U5 .....5.65
SparrowsPoint,Md. B2 ..5.65
Warren,O. R2 .....5.65
Youngstown Y1 .....6.15

PLATES, Open-Hearth Alloy
Claymont,Del. W16 ....4.85
Coatesville,Pa. L7 .....5.25
Conshohocken,Pa. A3 ..5.05
Fontana,Calif. K1 .....5.70
Gary,Ind. U5 .....4.75
Johnstown,Pa. B2 .....4.75
Munhall,Pa. U5 .....4.75
Sharon,Pa. S3 .....5.20
So.Chicago,Ill. U5 .....4.75
SparrowsPoint,Md. B2..4.75

FLOOR PLATES
Cleveland J5 .....4.75
Conshohocken,Pa. A3 ...4.75
Harrisburg,Pa. C5 .....5.95
Ind.Harbor,Ind. I-2 ...4.75
Munhall,Pa. U5 .....4.75
So.Chicago,Ill. U5 .....4.75

PLATES, Carbon A.R.
Fontana,Calif. K1 .....5.45

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Ashland,Ky.(15) A10 ..3.70
Bessemer,Ala. T2 .....3.70
Clairton,Pa. U5 .....3.70
Claymont,Del. W16 ....4.15
Cleveland J5, R2 .....3.70
Coatesville,Pa. L7 .....4.15
Conshohocken,Pa. A3 ..4.15
Ecorse,Mich. G5 .....3.75
Fairfield,Ala. T2 .....3.70
Fontana,Calif.(30) K1 ..4.30
Gary,Ind. U5 .....3.70
GraniteCity,Ill. G4 .....4.40
Geneva,Utah G1 .....3.70
Harrisburg,Pa. C5 .....4.95
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 .....3.70
Pittsburgh J5 .....3.70
Seattle B3 .....4.60
Sharon,Pa. S3 .....3.95
So.Chicago,Ill. U5, W14.3.70
SparrowsPoint,Md. B2..3.70
Steubenville,O. W10 ....3.70
Warren,O. R2 .....3.70
Weirton,W.Va. W6 .....4.00
Youngstown R2, U5, Y1.3.70

PLATES, Wrought Iron
Economy,Pa. B14 .....8.60

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ..3.95
Ashland,lcl.(15) A10 ..4.45
Cleveland,c.l. R2 .....4.30
Warren,O. c.l. R2 .....4.30

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Alton,Ill.(1) L1 .....3.45
Atlanta,Ga. A11 .....4.25
Bessemer,Ala. T2 .....3.70
Buffalo R2 .....3.70
Canton,O. R2 .....3.70
Clairton,Pa. U5 .....3.70
Cleveland R2 .....3.70
Detroit R7 .....3.85
Ecorse,Mich G5 .....3.65
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Minnequa,Colo. C10 ....4.15
Milton,Pa. B6 .....4.20
Niles,Calif. P1 .....4.17
N.Tonawanda,N.Y. B11.3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
Seattle B3, N14 .....4.45
So.Chicago R2, U5, W14.3.70
So.Duquesne,Pa. U5 ...3.70
So.SanFran.,Cal. B3 ...4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Weirton,W.Va. W6 .....3.85
Youngstown R2, U5 ....3.70

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....3.70
Atlanta A11 .....4.25
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ...3.70
Niles,Calif. P1 .....5.05
Portland,Oreg. O4 .....4.65
SanFrancisco S7 .....4.85

BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 .....3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 .....4.30
Buffalo R2 .....4.30
Canton,O. R2 .....4.30
Canton,O.(29) T7 .....3.95
Clairton,Pa. U5 .....4.30
Detroit R7 .....4.45
Ecorse,Mich. G5 .....4.25
Fontana,Calif. K1 .....5.35
Gary,Ind. U5 .....4.30
Houston,Tex. S5 .....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 .....4.30
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 .....5.35
Massillon,O. R2 .....4.30
Midland,Pa. C18 .....4.30
So.Chicago R2, U5, W14.4.30
So.Duquesne,Pa. U5 ...4.30
Struthers,O. Y1 .....4.30
Warren,O. C17 .....4.30
Youngstown U5 .....4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 .....4.55
Fontana,Calif. K1 .....5.30
Gary,Ind. U5 .....4.55
Youngstown U5 .....4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.55
Atlanta A11 .....5.35
Bessemer,Ala. T2 .....5.55
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.55
Cleveland R2 .....5.55
Ecorse,Mich. G5 .....5.65
Fairfield,Ala. T2 .....5.55
Fontana,Calif. K1 .....6.60
Gary,Ind. U5 .....5.55
Ind.Harbor,Ind. I-2 ...5.55
IndianaHarbor,Ind. Y1..6.05
Johnstown,Pa. B2 .....5.55
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.25
Pittsburgh J5 .....5.55
Seattle B3 .....6.30
So.Duquesne,Pa. U5 ...5.55
So.SanFrancisco B3 ....6.30
Struthers,O. Y1 .....6.05
Youngstown U5 .....5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....4.55
BeaverFalls,Pa.M12,R2 .4.55
Buffalo B5 .....4.60
Camden,N.J. P13 .....5.00
Carnegie,Pa. C12 .....4.55
Chicago W18 .....4.55
Cleveland A7, C20 ....4.55
Detroit P17 .....4.70
Donora,Pa. A7 .....4.55
Ecorse,Mich. G5 .....4.35
Elyria,O. W8 .....4.55
FranklinPark,Ill. N5 ...4.55
Gary,Ind. R2 .....4.55
GreenBay,Wis. F7 .....4.55
Hammond,Ind. L2, M13.4.55
Hartford,Conn. R2 .....5.10
Harvey,Ill. B5 .....4.55
LosAngeles R2 .....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R8 .....4.55
Midland,Pa. C18 .....4.55
Monaca,Pa. S17 .....4.55
Newark,N.J. W18 .....5.00
Plymouth,Mich. P5 .....4.80
Pittsburgh J5 .....4.55
Putnam,Conn. W18 .....5.10
Readville,Mass. C14 ....5.10
St. Louis,Mo. M5 .....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3 ...5.00
Struthers,O. Y1 .....4.55
Waukegan,Ill. A7 .....4.55
Youngstown F3, Y1 ....4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....5.40
BeaverFalls,Pa. M12 ...5.40
Bethlehem,Pa. B2 .....5.40
Buffalo B5 .....5.40
Camden,N.J. P13 .....5.80
Canton,O. R2 .....5.40
Canton,O.(29) T7 .....4.90
Carnegie,Pa. C12 .....5.40
Chicago W18 .....5.40
Cleveland A7 .....5.45
Cleveland C20 .....5.40
Detroit P17 .....5.55
Donora,Pa. A7 .....5.45
Elyria,O. W8 .....5.40
Gary,Ind. R2 .....5.40
Hammond,Ind. L2, M13.5.40
Hartford,Conn. R2 .....5.85
Harvey,Ill. B5 .....5.40
Lackawanna,N.Y. B2 ...5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2, R8 ...5.40
Midland,Pa. C18 .....5.40
Monaca,Pa. S17 .....5.40
Newark,N.J. W18 .....5.75
Plymouth,Mich. P5 .....5.60
So.Chicago,Ill. R2, W14.5.40
Struthers,O. Y1 .....5.40
Warren,O. C17 .....5.40
Waukegan,Ill. A7 .....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

RAIL STEEL BARS
ChicagoHts.(3,4)I-2, C2.4.75
Dallas,Tex.(4) S20 ....6.00
Franklin,Pa.(3,4) F5 ..4.75
FortWorth,Tex.(26) T4.4.63
Huntngtn,W.Va.(3) W7 .5.50
Marion,O.(3) P11 .....4.75
Moline,Ill.(3) R2 .....3.80
Tonawanda(3,4) B12 ...4.75
Williamsport(3) S19 ....5.00
Williamsport(4) S19 ....5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt)U1 15.00
Dover(Eng.Bolt) U1 ..13.50
Dover(Wrgt.Iron) U1 .12.25
Economy,Pa.(S.R.) B14.9.60
Economy,Pa.(D.R.)B14 11.90
Economy(Staybolt)B14 12.20
McK.Rks.(Staybolt) L5.14.50
McK.Rks.(S.R.) L5 ...9.60
McK.Rks.(D.R.) L5 ...13.00

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..3.70
Alton,Ill.(6) L1 .....3.45
Atlanta A11 .....4.25
Buffalo R2 .....3.70
Cleveland R2 .....3.70
Emeryville,Calif. J7 ...4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ...3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.50
Niles,Calif. P1 .....5.05
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
SandSprings,Okla. S5 ..4.60
Seattle B3, N14 .....4.45
So.Chicago,Ill. R2 .....3.70
So.Duquesne,Pa. U5 ...3.70
So.SanFrancisco B3 ....4.45
SparrowsPoint,Md. B2 ..3.70
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Youngstown R2, U5 ....3.70

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 ..5.50
Johnstown, ¼-1" B2 ...4.75
LosAngeles B3 .....5.45
Marion,O. P11 .....5.00
Seattle B3, N14 .....5.55
So.SanFrancisco B3 ....5.45
SparrowsPt. ¼-1" B2..4.75
Williamsport,Pa. S19 ...5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ..3.60
Ashland,Ky.(8) A10 ..3.60
Butler,Pa. A10 .....3.60
Cleveland J5, R2 .....3.60
Conshohocken,Pa. A3 ..4.00
Detroit M1 .....4.40
Dover,O. R1 .....5.65
Ecorse,Mich.(8) G5 ...3.80
Fairfield,Ala. T2 .....3.60
Fontana,Calif. K1 .....4.55
Gary,Ind. U5 .....3.60
GraniteCity,Ill. G4 ....4.30
Geneva,Utah G1 .....3.70
Ind.Harbor,Ind. I-2, Y1.3.60
Irvin,Pa. U5 .....3.60
Lackawanna,N.Y. B2 ...3.60
Munhall,Pa. U5 .....3.60
Niles,O. N12 .....5.25
Pittsburg,Calif. C11 ....4.30
Pittsburgh J5 .....3.60
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.60
SparrowsPoint,Md. B2 ..3.60
Steubenville,O. W10 ....3.60
Torrance,Calif. C11 ....4.30
Warren,O. R2 .....3.60
Weirton,W.Va. W6 .....3.60
WestLeechburg,Pa. A4..3.75
Youngstown U5, Y1 ....3.60

SHEETS, H-R (19 gage)
AlabamaCity,Ala. R2 ..4.75
Ind.Harbor,Ind. I-2 ....5.40
Mansfield,O. E6 .....5.65
Niles,O. N12 .....5.75
Torrance,Calif. C11 ....5.40

SHEETS, H-R (14-ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 .....5.40
Conshohocken,Pa. A3 ..5.65
Ecorse,Mich. G5 .....5.50
Fairfield,Ala. T2 .....5.40
Fontana,Calif. K1 .....6.35
Gary,Ind. U5 .....5.40
Ind.Harbor,Ind. I-2 ....5.40
IndianaHarbor,Ind. Y1..5.90
Irvin,Pa. U5 .....5.40
Lackawanna(35) B2 ....5.40
Pittsburgh J5 .....5.40
Sharon,Pa. S3 .....5.40
So.Chicago,Ill. U5 .....5.40
SparrowsPoint(36) B2 ..5.40
Warren,O. R2 .....5.40
Weirton,W.Va. W6 ....5.75
Youngstown U5 .....5.40
Youngstown Y1 .....5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 .....6.55
Ecorse,Mich. G5 .....6.65
Fontana,Calif. K1 ....7.50
Gary,Ind. U5 .....6.55
IndianaHarbor,Ind. Y1 .7.05
IndianaHarbor,Ind. I-2 .6.55
Irvin,Pa. U5 .....6.55
Lackawanna(37) B2 ...6.55
Pittsburgh J5 .....6.55
SparrowsPoint(38) B2 ..6.55
Warren,O. R2 .....6.55
Weirton,W.Va. W6 .....6.90
Youngstown Y1 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.35
Cleveland J5, R2 .....4.35
Ecorse,Mich. G5 .....4.55
Fairfield,Ala. T2 .....4.35
Follansbee,W.Va. F4 ...5.35
Fontana,Calif. K1 .....5.30
Gary,Ind. U5 .....4.35
GraniteCity,Ill. G4 .....5.05
Ind.Harbor,Ind. I-2, Y1.4.35
Irvin,Pa. U5 .....4.35
Lackawanna,N.Y. B2 ..4.35
Middletown,O. A10 ....4.35
Pittsburg,Calif. C11 ....5.30
Pittsburgh J5 .....4.35
SparrowsPoint,Md. B2 ..4.35
Steubenville,O. W10 ....4.35
Warren,O. R2 .....4.35
Weirton,W.Va. W6 ....4.35
Youngstown Y1 .....4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala., R2 ..4.80
Ashland,Ky.(8) A10 ...4.80
Canton,O. R2 .....4.80
Dover,O. R1 .....5.50
Fairfield,Ala. T2 .....4.80
Gary,Ind. U5 .....4.80
GraniteCity,Ill. G4 ....5.50
Ind.Harbor,Ind. I-2 ....4.80
Irvin,Pa. U5 .....4.80
Kokomo,Ind.(13) C16 ..5.20
MartinsFerry,O. W10 ..4.80
Niles,O. N12 .....6.00
Pittsburg,Calif. C11 ....5.55
SparrowsPoint,Md. B2 ..4.80
Steubenville,O. W10 ....4.40
Torrance,Calif. C11 ....5.55
Weirton,W.Va. W6 ....4.80

SHEETS, Galvanized No. 10, High-Strength Low Alloy

Irvin,Pa. U5 .....7.20
SparrowsPoint(39) B2 ..6.75

SHEETS, Galvanneal Steel

Canton,O. R2 .....5.35
Irvin,Pa. U5 .....5.35
Kokomo,Ind.(13) C16...5.75
Niles,O. N12 .....6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10 .....5.05
Middletown,O. A10 ....5.05

SHEETS, Electro Galvanized

Cleveland R2 (28) 5.65
Niles,O. R2 (28) 5.65
Weirton,W.Va. W6 ....5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2 ....5.70

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10 5.20
Gary,Ind. U5 .....5.20
Mansfield,O. E6 .....6.05
Middletown,O. A10 .....5.20
Niles,O. N12 .....6.00
Weirton,W.Va. W6 .....5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....5.60

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2 .....$7.60
Gary,Ind. U5 .....7.50
Irvin,Pa. U5 .....7.50
SparrowsPoint,Md. B2 ..7.60
Yorkville,O. W10 .....7.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10 .....$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5 .....$9.50
Warren,O. R2 .....9.50
Yorkville,O. W10 .....9.50

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. U5 .....$17.50

BLUED Stock, 29 Ga.

Yorkville,O. W10 .....6.80
Follansbee,W.Va.(23)F4 6.85

SHEETS, Culvert No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.60	...
Canton,O. R2 ...	5.65	6.10
Fairfield,Ala. T2.	5.60	5.85
Gary U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo C16	6.25	...
MartinsFy,O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt, B2..	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10 .....5.85
Fairfield,Ala. T2 .....5.60

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10 .....3.85
Cleveland R2 .....4.20
Ind.Harbor,Ind. I-2 ....3.85
Warren,O. R2 .....4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....4.95
Middletown,O. A10 ....4.85
Warren,O. R2 .....4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10 ...5.05
Canton,O. R2 .....5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 .....5.30
Middletown,O. A10 ....5.30

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ....4.65
Cleveland R2 .....4.65
Ecorse,Mich. G5 .....4.70
Gary,Ind. U5 .....4.65
GraniteCity,Ill. G4 ....5.35
Ind.Harbor,Ind. I-2 ....4.65
Irvin,Pa. U5 .....4.65
Middletown,O. A10 .....4.65
Youngstown Y1 .....4.65

SHEETS, Drum Body

Pittsburg,Calif. C11 ....4.30
Torrance,Calif. C11 ....4.30

SHEETS, Well Casing

Fontana,Calif. K1 .....5.10
TorranceCalif. C11 .....5.10

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.40
SparrowsPoint,Md. B2	7.25	7.50	7.75
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	....	....	....
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	....	....	....
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)

	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	....	....	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

TIN PLATE, American COKE (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2.	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1.	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts,,Cal. C11 ...	9.20	9.40
Sp.Pt.,Md. B2 ...	8.55	8.75
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10.	8.45	8.70

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$6.25
Fairfield,Ala. T2 .....6.35
Gary,Ind. U5 .....6.25
GraniteCity,Ill. G4 .....6.45
Ind.Harbor,Ind. I-2, Y1.6.25
Irvin,Pa. U5 .....6.25
Niles,O. R2 .....6.25
Pittsburg,Calif. C11 .....7.00
SparrowsPoint,Md. B2 ..6.35
Warren,O. R2 .....6.25
Weirton,W.Va. W6 .....6.25
Yorkville,O. W10 .....6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4 ...5.85
Gary,Ind. U5 .....5.85
GraniteCity,Ill. G4 .....6.05
Ind.Harbor,Ind. Y1 ....5.30
Irvin,Pa. U5 .....5.85
Niles,O. R2 .....5.30
SparrowsPoint,Md. B2 ..5.40
Warren,O. R2 .....5.30
Yorkville,O. W10 .....6.15

SHEETS, ALUMINIZED

Butler,Pa. A10 .....8.15

STRIP, Hot-Rolled, High-Strength Low-Alloy

Atlanta(9) A11 .....5.10
Bessemer,Ala. T2 .....5.30
Conshohocken,Pa. A3 ..5.55
Ecorse,Mich. G5 .....5.40
Fairfield,Ala. T2 .....5.30
Fontana,Cal. K1 .....6.20
Gary,Ind. U5 .....5.30
Ind.Harb.,Ind. I-2 ....5.30
IndianaHarbor,Ind. Y1..5.80
Lackawanna,N.Y. B2 ..4.95
LosAngeles(25) B3 .....6.05
Seattle B3 .....6.30
Sharon,Pa. S3 .....5.40
So.SanFrancisco(25) B3.6.05
SparrowsPoint,Md. B2 ..4.95
Warren,O. R2 .....5.30
Weirton,W.Va. W6 .....5.75
Youngstown Y1 .....5.80
Youngstown U5 .....5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5 .....6.70
Dover,O. G6 .....7.30
Ecorse,Mich. G5 .....6.65
Fontana,Calif. K1 .....6.95
Lackawanna,N.Y. B2 ..6.40
Sharon,Pa. S3 .....6.55
SparrowsPoint,Md. B2 ..6.40
Warren,O. R2 .....6.55
Weirton,W.Va. W6 ....7.20
Youngstown Y1 .....7.05

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)S15 10.10
Carnegie,Pa. S18 .....10.60
Cleveland A7.....10.00
Dover,O. G6 .....10.50
Fontana,Calif. K1 .....11.65
Harrison,N.J. C18 ....10.60
NewBritn.Conn.(10)S15 10.10
Pawtucket,R.I.(11) N8.10.75
Pawtucket,R.I.(12) N8.11.05
Sharon,Pa. S3 .....10.60
Worcester,Mass. A7 ...10.30
Youngstown C8 .....10.60

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...3.50
Alton,Ill.(1) L1 .....3.25
Ashland,Ky.(8) A10 ....3.50
Atlanta A11 .....4.05
Bessemer, Ala. T2 .....3.50
Bridgeprt,Conn.(10) S15.4.00
Buffalo(27) R2 .....3.50
Butler,Pa. A10 .....3.50
Carnegie,Pa. S18 .....4.00
Conshohocken,Pa. A3 ..3.90
Detroit M1 .....4.40
Ecorse,Mich. G5 .....3.45
Fairfield,Ala. T2 .....3.50
Fontana,Calif. K1 .....4.75
Gary,Ind. U5 .....3.50
Houston,Tex. S5 .....4.90
Ind.Harbor,Ind. I-2, Y1.3.50
Johnstown,Pa.(25) B2 ..3.50
KansasCity,Mo.(9) S5 ..4.10
Lackawanna,N.Y.(32)B2 3.50
LosAngeles B3 .....4.25
Milton,Pa. B6 .....4.00
Minnequa,Colo. C10 ....4.55
NewBritain(10) S15 ....4.00
N.Tonawanda,N.Y. B11.3.50
Pittsburg,Calif. C11 ....4.25
Riverdale,Ill. A1 .....3.50
SanFrancisco S7 .....4.85
Seattle B3. N14 .....4.50
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.50
So.SanFrancisco B3 ....4.25
SparrowsPoint,Md. B2 ..3.50
Torrance,Calif. C11 ....4.25
Warren,O. R2 .....3.50
Weirton,W.Va. W6 .....3.60
WestLeechburg,Pa. A4..3.75
Youngstown U5, Y1 ....3.50

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15 5.45
Carnegie,Pa. S18 .....5.85
Fontana,Calif. K1 .....6.70
Gary,Ind. U5 .....5.50
Houston,Tex. S5 .....5.90
KansasCity,Mo. S5 ....6.10
NewBritn,Conn.(10) S15 5.45
Sharon,Pa. S3 .....5.85
Youngstown U5 .....5.50

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....3.75
Warren,O. R2 .....4.10

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	....	...	7.70	9.65	....
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	*5.60*	*7.05*	*7.65*	...	....
Detroit D2	5.60	6.65	7.25	...	....
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
Franklin,Park,Ill. T6 ..	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	....
NewCastle,Pa. B5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2 ..	5.85	6.75	7.35	...	....
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8: Cleve-or-Pitts.Base ..	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2 .	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6 ...	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7 ..	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6 ...	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork W3	...	...	10.30	12.50	15.35

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6 ..5.50
Berea,O. C7 .....6.60
Bridgeprt,Conn.(10) S15.5.35
Butler,Pa. A10 .....4.65
Cleveland A7, J5 .....4.65
Dearborn,Mich. D3 .....*5.60*
Detroit D2 .....5.60
Detroit M1 .....5.45
Dover,O.(40) G6 .....5.50
Ecorse,Mich. G5 .....4.35
Follansbee,W.Va. F4 ...5.35
Fontana,Calif. K1 .....6.30
FranklinPark,Ill.(40)T6 4.90
Ind.Harbor,Ind. I-2 ....4.90
Lackawanna,N.Y. B2 ...4.65
LosAngeles C1 .....6.40
Mattapan,Mass. T6 ....5.50
Middletown,O. A10 .....4.65
NewBritain(10) S15 ....5.35
NewCastle,Pa. B4 .....5.35
NewCastle(40) E5 .....5.25
NewHaven,Conn. D2 ...5.85
NewHaven,Conn. A7 ...5.15
Pawtucket,R.I. R3 .....6.00
Pawtucket,R.I.(21) N8..5.85
Riverdale,Ill.(40) A1 ...4.90
Rome,N.Y. R6 .....5.10
Sharon,Pa. S3 .....5.35
SparrowsPoint,Md. B2 ..4.65
Trenton,N.J. R5 .....6.00
Wallingford,Conn. W2 ..5.85
Warren,O.(40) T5 .....5.25
Warren,O. R2 .....4.65
Weirton,W.Va. W6 .....4.65
WestLeechburg,Pa. A4..4.65
Youngstown C8, (40) ...5.25
Youngstown Y1 .....4.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....5.25

STRIP, Electro Galvanized

Cleveland A7 .....4.65
Dover,O. G6 .....5.50
Warren,O. T5 .....5.25
Weirton,W.Va. W6 ....4.65
Youngstown C8 .....5.25

TIGHT COOPERAGE HOOP

Atlanta A11 .....4.05
Riverdale,Ill. A1 .....3.90
Sharon,Pa. S3 .....4.15
Youngstown U5 .....3.75

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.
B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.
C1 Calif. Cold Rolled Steel
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve.Cold.Roll.Mills Co.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.
F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
H1 Hanna Furnace Corp.
H4 Heppenstall Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta A11	5.10
Alton,Ill.(1) L1	4.50
Bartonville,Ill.(1) K4	4.85
Buffalo W12	4.85
Chicago W13	4.85
Cleveland A7	4.85
Cleveland C20	4.55
Crawfordsville,Ind. M8	5.10
Donora,Pa. A7	4.85
Duluth A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(24) S1	*5.35*
Houston S5	5.25
Johnstown,Pa. B2	4.85
Joliet,Ill. A7	4.85
KansasCity,Mo. S5	5.45
Kokomo,Ind. C16	4.95
LosAngeles B3	5.80
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark, 6-8ga. I-1	5.50
No. Tonawanda B11	4.85
Palmer,Mass. W12	5.15
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So.SanFrancisco C10	5.80
SparrowsPoint,Md. B2	4.95
Sterling,Ill.(1) N15	4.85
Struthers,O. Y1	4.85
Torrance,Calif. C11	5.80
Waukegan,Ill. A7	4.85
Worcester,Mass. A7, T6	5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	6.20
Buffalo W12	6.35
Cleveland A7	5.85
Crawfordsville,Ind. M8	6.20
Detroit D2	6.20
Dover,O. G6	6.20
Fostoria,O. S1	6.00
Kokomo,Ind. C16	5.70
FranklinPark,Ill. T6	6.20
Massillon, O. R8	5.85
Monessen,Pa. P16	5.85
Monessen,Pa. P7	6.10
NewHaven,Conn. D2	6.50
Pawtucket,R.I.(12) N8	6.85
Trenton,N.J. R5	6.16
Worcester T6	6.50
Worcester W12	6.65
Worcester A7	6.00

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4	8.50
Monessen,Pa. P16	8.50
Roebling,N.J. R5	8.80
SparrowsPoint,Md. B2	8.25

ROPE WIRE

	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.55	8.55	8.80
Buffalo W12	8.55	8.55	8.80
Cleveland A7	8.55	8.55	8.80
Donora,Pa. A7	8.55	8.55	8.80
Fostoria,O. S1	*8.85*	*8.85*	*9.10*
Johnstown,Pa. B2	8.05	8.05	8.30
Monessen,Pa. P16	8.55	8.55	8.80
Monessen,Pa. P7	8.80	8.80	9.05
NewHaven,Conn A7	8.85	8.85	9.10
Palmer,Mass. W12	8.85	8.85	9.10
Portsmouth,O. P12	8.55	8.55	8.80
Roebling,N.J. R5	8.85	8.85	9.10
SparrowsPoint,Md. B2	8.15	8.15	8.40
Struthers,O. Y1	8.55	8.55	8.80
Trenton,N.J. A7	8.85	8.85	9.10
Waukegan,Ill. A7	8.55	8.55	8.80
Williamsport,Pa. B2	8.15	8.15	8.40
Worcester,Mass. J4	8.35	8.35	8.60
Worcester,Mass. T6	8.85	8.85	9.10

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
AlabamaCity R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19)K4	5.95	6.15
Buffalo W12	5.70	...
Cleveland A7	5.70	6.15
Crawfordsville M8	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
SparrowsPt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	11.85
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle M.8	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.15	12.05
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass.W12	10.25	12.15
Pitts.,Cal. C11	10.25	12.15
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.25	12.15
Waukegan A7	10.25	12.15

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo W12	8.90
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville,Ind. M8	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.45
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N.J. R5	9.20
Waukegan,Ill. A7	8.90
Worcester,Mass. A7, T6	9.20

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill.(1) L1	5.90
Bartonville,Ill.(1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora,Pa. A7	6.25
Duluth A7	6.25
Fostoria,O. S1	*6.25*
Johnstown,Pa. B2	6.25
LosAngeles B3	7.20
Millbury,Mass.(12) N6	*8.05*
Monessen,Pa. P7, P16	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.55
Portsmouth,O. P12	6.25
So.Chicago,Ill. R2	6.25
So.SanFrancisco C10	6.85
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester A7, J4, W12	6.55
Worcester,Mass. N6, T6	6.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill. (1) L1	5.55
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	6.85
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville M8	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2	140
Duluth A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	130
Johnstown,Pa. B2	125
Joliet,Ill. A7	125
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago R2	140
Tonawanda B12	140
Williamsport,Pa. S19	150

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2	126
Ala.City,Ala.,17-18ga.R2	213
Aliquippa,Pa.9-14½ga. J5	130
Atlanta A11	133
Bartonville,Ill. (19) K4	130
Crawfordsville,Ind. M8	132
Donora,Pa. A7	130
Duluth A7	130
Houston,Tex. S5	138
Fairfield,Ala. T2	130
Johnstown,Pa. B2	130
Johnstown,17ga.,6" B2	204
Johnstown,17ga.,4" B2	207
Joliet,Ill. A7	130
KansasCity,Mo. S5	142
Kokomo,Ind. C16	132
Minnequa,Colo. C10	138
Monessen,Pa. P7	135
Pittsburg,Calif. C11	153
Portsmouth,O.(18) P12	137
Rankin,Pa. A7	130
So.Chicago,Ill. R2	126
Sterling,Ill.(1) N15	130

BALE TIES, Single Loop Col.

AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Chicago W13	123
Crawfordsville M8	132
Donora,Pa. A7	123
Duluth A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

AXLES

Ind.Harbor,Ind. S13 ... 5.60
Johnstown,Pa. B2 ... 5.60

JOINT BARS

Bessemer,Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(32) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.10

NAILS & STAPLES, Stock to dealers & mfrs. (7) Col.

AlabamaCity,Ala. R2 ... 118
Aliquippa,Pa.(13) J5 ... 118
Atlanta A11 ... 121
Bartonville,Ill.(19) K4 ... 118
Chicago,Ill. W13 ... 130
Cleveland A9 ... 111
Crawfordsville,Ind. M8 ... 122
Donora,Pa. A7 ... 118
Duluth A7 ... 118
Fairfield,Ala. T2 ... 118
Galveston,Tex. D7 ... 126
Houston,Tex. S5 ... 126
Johnstown,Pa. B2 ... 118
Joliet,Ill. A7 ... 118
KansasCity,Mo. S5 ... 130
Kokomo,Ind. C16 ... 120
Minnequa,Colo. C10 ... 123
Monessen,Pa. P7 ... 124
Pittsburg,Calif. C11 ... 137
Portsmouth,O. P12 ... 124
Rankin,Pa. A7 ... 118
So.Chicago,Ill. R2 ... 118
SparrowsPoint,Md. B2 ... 120
Sterling,Ill.(1) N15 ... 118
Torrance,Calif. C11 ... 138
Worcester,Mass. A7 ... 124

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	6.10
Bartonville,Ill.(19) K4	5.95
Crawfordsville,Ind. M8	6.30
Donora,Pa. A7	5.95
Duluth A7	5.95
Johnstown,Pa. B2	5.95
Joliet,Ill. A7	5.95
Kokomo,Ind. C16	6.05
Minnequa,Colo. C10	6.20
Pittsburg,Calif. C11	6.90
Portsmouth,O. P12	6.25
Rankin,Pa. A7	5.95
So.Chicago,Ill. R2	6.10
SparrowsPoint,Md. B2	6.05
Sterling,Ill.(1) N15	5.65
Worcester,Mass. A7	6.25

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3 ... $7.35
Wheeling,W.Va. W10 ... 7.15

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburg,Calif. C11	4.65
Seattle B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

RAILS

	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

Key to Producing Companies

M1	McLouth Steel Corp.		Detroit Steel Corp.	T3	Tenn. Prod. & Chem.
M4	Mahoning Valley Steel	P13	Precision Drawn Steel	T4	Texas Steel Co.
M5	Medart Co.	P14	Pitts.Screw & Bolt Co.	T5	Thomas Steel Co.
M6	Mercer Tube & Mfg. Co.	P15	Pittsburgh Metallurgical	T6	Thompson Wire Co.
M8	Mid-States Steel & Wire	P16	Page Steel & Wire Div., Amer. Chain & Cable	T7	Timken Roller Bearing
M9	Midvale Co.			T9	Tonawanda Iron Div.
M10	Missouri-Illinois Furnace	P17	Plymouth Steel Co.		Am. Rad. & Stan. San.
M12	Moltrup Steel Products	R1	Reeves Steel & Mfg. Co.	U1	Ulster Iron Works
M13	Monarch Steel Co.	R2	Republic Steel Corp.	U4	Universal Cyclops Steel
M14	McInnes Steel Co.	R3	Rhode Island Steel Corp.	U5	United States Steel Co.
N2	National Supply Co.	R5	Roebling's Sons, John A.	V2	Vanadium Alloys Steel
N3	National Tube Co.	R6	Rome Strip Steel Co.	V3	Vulcan Crucible Steel Co.
N5	Nelsen Steel & Wire Co.	R7	Rotary Electric Steel Co.	W1	Wallace Barnes Co.
N6	NewEng.HighCarb.Wire	R8	RelianceDiv.,EatonMfg.	W2	Wallingford Steel Co.
N8	Newman-Crosby Steel	S1	Seneca Wire & Mfg. Co.	W3	Washburn Wire Corp.
N12	Niles Rolling Mill Co.	S3	Sharon Steel Corp.	W4	Washington Steel Corp.
N14	Nrthwst. Steel Roll. Mills	S5	Sheffield Steel Corp.	W6	Weirton Steel Co.
N15	Northwestern S.&W. Co.	S6	Shenango Furnace Co.	W7	W. Va. Steel & Mfg. Co.
N16	New Delphos Mfg. Co.	S7	Simmons Co.	W8	West.Auto.Mach.Screw
O3	Oliver Iron & Steel Corp.	S8	Simonds Saw & Steel Co.	W9	Wheatland Tube Co.
O4	Oregon Steel Mills	S9	Sloss-Sheffield,S.&I. Co.	W10	Wheeling Steel Corp.
P1	Pacific States Steel Corp.	S13	Standard Forgings Corp.	W12	Wickwire Spencer Steel Div., Colo. Fuel & Iron
P2	Pacific Tube Co.	S14	Standard Tube Co.		
P4	Phoenix Iron & Steel Co.	S15	Stanley Works	W13	Wilson Steel & Wire Co.
P5	Pilgrim Drawn Steel	S16	Struthers Iron & Steel	W14	Wisconsin Steel Div. International Harvester
P6	Pittsburgh Coke&Chem.	S17	Superior Drawn Steel Co.		
P7	Pittsburgh Steel Co.	S18	Superior Steel Corp.	W15	Woodward Iron Co.
P9	Pittsburgh Tube Co.	S19	Sweet's Steel Co.	W16	Worth Steel Co.
P11	Pollak Steel Co.	S20	Southern States Steel	W18	Wyckoff Steel Co.
P12	Portsmouth Division,	T2	Tenn. Coal, Iron & R.R.	Y1	Youngstown Sheet&Tube

TOOL STEELS

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	18W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,9Co	204.00
Spec. Carbon	32.50	19W,4Cr,2V,7Co	204.00
Oil Hardening	35.00	18.25W,4.25Cr,1V,4.75Co	172.00
Cr Hot Wrk	35.00	20.25W,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	110.00	6.4W,4.5Cr,1.9V,5Mo	84.00
18W,4Cr,2V	124.50	6W,4Cr,3V,6Mo	106.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M14, S8, T7, U4, V2, V3.

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga & heavier.
(14) Also wide flange beams.
(15) ¼" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, to fabricators (⅜" bar size, furn. billet, 5.03c); to consumers, 5.23c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter; 48" & narrower.
(38) 14 gage & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
⅛	5.5c	0.24	34.0	32.0	29.0	1.5	+0.5	0.5
¼	6.0	0.42	28.5	26.5	26.0	+1.0	+3.0	0.5
⅜	6.0	0.57	23.5	21.5	21.5	+7.0	+9.0	4.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜"; following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11½ points lower on ⅛" and larger continuous weld and 24% on 3½" and 4".

Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Lorain base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ¼", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ⅛" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Galv. B	Elec. Weld Black C	Galv. D
2	37.0c	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain, N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W Ga.	—Seamless— H.R.	C.D.	Elec. Weld H.R.	C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2¼	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	—Plates— Carbon Base 10%	20%	—Strip— Cold-Rolled Carbon Base 10%	Both Sides	—Sheets— Carbon Base 10%	20%	Cu Base Both Sides
302	....	....	....	....	19.75	27.50	77.00
304	25.00	28.00–29.50	....	....	20.75–24.50	27.50	77.00
309	30.50	35.00	....	....	....	....	....
310	36.50	41.00	....	....	....	....	144.00
316	29.50	31.50–34.00	....	....	26.00	36.50	....
317	34.50	39.00	....	....	....	....	....
318	33.50	38.00	....	....	....	....	....
321	26.50	31.00	....	....	23.00	33.00	111.00
347	27.50	30.50–32.00	....	....	24.00	33.50	130.00
405	21.25	27.75	....	....	....	....	....
410	20.75	27.25	....	....	....	....	....
Nickel	33.25	44.25	41.00	54.00	....	....	....
Inconel	41.00	53.50	....	....	....	....	165.00
Monel	34.75	45.75	....	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ¾-in. 18.5
- ⅞-in. and larger..... 17.5

Longer than 6 in.: All diams. 14

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 26
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ⅞-in.	12	6.5
1-in.-1½-in.	9	1
1⅝ in. & larger	7.5	1
H.R. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅞-in.	16.5	6.5
1-in.-1½-in.	12	2
1⅝ in. & larger	8.5	2
C.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅞-in.	23	17.5
1-in. & 1⅛-in.	19.5	12
1⅛-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Hvy.	Reg.
½-in. & smaller	35	28.5
⅝-in. & ⅞-in.	29.5	22
1-in.-1½-in.	24	15
1⅝-in. & larger	13	8.5
Light		
⅞-in. & smaller		35
½-in. to ⅝-in.		28.5
¾-in. to 1½-in.		26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....56 & 10
Plated finishes.....41 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅛-in. & smaller 47
- ¾-in. through 1 in. ... 40

Longer than 6 in.:
- ⅝-in. & smaller 33
- ¾-in. through 1 in. ... 18

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 44
1 in. and smaller diam. x over 6 in. 33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 41
¼-in. diam. & larger .. 24
N.F. thread, all diams... 18

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
⅞-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ....List to 50c off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

—Inches— Diam.	Length	Cents per lb
17,18,20	60,72	17.00
8 to 16	48,60,72	17.00
7	48,60	18.64
6	48,60	19.95
4,5½	40	20.48
3	40	21.53
2½	24,30	22.05
2	24,30	24.15

CARBON

40	100,110	7.65
35	100,110	7.65
30	84,110	7.65
24	72 to 104	7.65
17 to 20	34,90	7.65
14	60,72	8.16
10,12	60	8.42

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	41.00	34.00	31.25
302	41.00	36.50	31.25
303	43.00	40.00	33.75
304	43.00	38.50	32.75
309	55.50	54.50	44.25
316	56.50	58.50	48.75
321	49.00	48.00	36.75
347	53.50	52.00	41.25
410	36.50	30.50	25.75
416	37.00	37.00	26.25
420	44.00	47.00	31.25
430	39.00	31.00	26.25
501	27.50	26.00	14.25
502	28.50	27.00	15.25

Brackenridge, Pa., sheets A4.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.

Cleveland, strip A7.

Dunkirk,N.Y., bars, wire A4.

Duquesne, Pa., bars U5.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip C18.

McKeesport, Pa., bars, sheets except Type 416 U5.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.

Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol 30.00-35.00

Toluol, one deg...26.00-33.00

Industrial xylol ..25.00-33.50
Per ton bulk, ovens

Sulphate of ammonia..$32.-45
Cents per pound, ovens

Phenol, 40 (carlots, non-returnable drums) ..17.25

Do., less than carlots..18.00

Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $41; less than 60%, $38.

Imported, net ton, duty paid, metallurgical grade, $28-$29.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

Sponge Iron Cents
- 98+% Fe, carlots.. 16.00
- Swedish, c.i.f. New York, in bags ...7.40-8.50

Electrolytic Iron:
- Annealed, 99.5% Fe. 42.50
- Unannealed, 99+% Fe 36.50
- Unannealed, 99+% Fe(minus 325 mesh) 58.50

Powder Flakes 48.50

Carbonyl Iron:
- 97.9-99.8%, size 5 to 10 microns..83.00-148.00

Aluminum:
- Carlots, freight allowed 29.50
- Atomized, 500 lb drums, freight allowed 33.50

Brass, 10-ton lots 30.00-33.25

Copper:
- Electrolytic 37.50
- Reduced 33.75-37.00

Lead 25.50

Manganese:
- Minus 100-mesh 57.00
- Minus 35 mesh 52.00
- Minus 200 mesh 62.00

Nickel unannealed 83.00

Nickel-Silver, 10-ton lots 44.00

Silicon 38.50

Solder (plus cost of metal) 8.50

Stainless Steel, 302 ....$1.25

Tin $1.69

Zinc, 10-ton lots..23.00-30.50

Tungsten: Dollars
- 99%, minus 80 to 200 mesh, freight allowed: over 1000 lb 2.90
- 1000 lb 2.95
- Less than 1000 lb ... 3.00
- 98.8% minus 65 mesh, freight allowed: 1000 lb and over... 4.15
- less than 1000 lb... 4.25

Molybdenum:
- 99%, minus 80 to 200 mesh, over 500 lb 2.85
- 200 to 500 lb 3.10
- less than 200 lb ... 3.25

Chromium, electrolytic 99% Cr min. 3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll,fur. .$14.50-15.00
Connellsvll,fdry. .17.00-18.00
New River, foundry ...19.50
Wise county, foundry..15.95
Wise county, furnace..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens..$22.75
Everett, Mass., ovens
- New England, del...24.80

Chicago, ovens 21.00
- Chicago, del. 22.45
- Detroit, del. 24.91

Terre Haute, ovens....22.50
Milwaukee, ovens 23.75
Indianapolis, ovens 22.75
- Chicago, del. 26.62
- Cincinnati, del. 25.67
- Detroit, del. 26.65

Ironton, O., ovens 21.50
- Cincinnati, del. 24.06

Painesville, O., ovens..24.00
- Buffalo, del. 26.12
- Cleveland, del. 25.72

Erie, Pa., ovens 23.50
Birmingham, ovens 20.80
- Birmingham, del. ...21.35

Philadelphia, ovens 22.70
NevilleIsland,Pa.,ovens 23.00
Swedeland, Pa., ovens.22.00
St. Louis, ovens 24.25
- St. Louis, del. 25.38

Portsmouth, O., ovens.21.50
- Cincinnati, del. 24.06

Detroit, ovens 24.00
- Detroit, del. *25.00
- Buffalo, del. 27.04
- Flint, del. 26.44
- Pontiac, del. 25.39
- Saginaw, del. 26.75

Includes representative switching charge of: *, $1.00; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York(city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
New York(c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city) ..	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try) .	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city) ..	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try) ..	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city) ...	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try) ..	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va. ..	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va..	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse) .	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)..	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
Pitts. (w'hse) .	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse).	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse) .	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city) ..	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city) .	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.)	5.68	6.48	7.28	5.63	...	5.63	6.28	10.08††§	5.78	5.93	7.13
St. L. (w'hse).	5.48	6.28	7.08	5.43	...	5.43	6.08	9.88††§	5.58	5.73	6.93
Kans. City(city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity(w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Birm'hm(city) .	5.75	6.55	6.90[2]	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm(w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05[3]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)..	6.35	7.90	8.85[3]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco..	6.65	7.80[9]	8.65[9]	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma.	7.05	8.60[5]	9.20	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [5]—1600 to 1999 lb; [7]—300 to 999 lb; [9]—400 to 9999 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Hayward, Ashland, Ky., Clearfield, Curwensville, Pa., Ottawa, Ill., $116.60. Hard-fired, St. Louis, Vandalia, Mo., Olive Hill, Ky., $156.20.

High-Heat Duty: Salina, Pa. $99.60; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, Curwensville, Lumber, Lockhaven, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Bessemer, Ala., Portsmouth, Oak Hill, O., Ottawa, Ill.,$94.60.

Intermediate-Heat Duty: St. Louis, Farber, Vandalia, Mo., West Decatur, Orviston, Beach Creek, Curwensville, Lumber, Lockhaven, St. Marys, Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Hayward, Ky., Athens, Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $88; Bessemer, Ala., $79.20.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., $79.20; Parral, O., $78.50; St. Marys, Pa., $76; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Chester, New Cumberland, W. Va., Freeport, Merlil Station, Clearfield, Pa., Irondale, Wellsville, O., $66.

Wire Cut: Chester, Wellsville, O., $64.

MALLEABLE BUNG BRICK

St. Louis, Vandalia, Farber, Mo., Olive Hill, Ky., $105.60; Beach Creek, Pa., $94.60; Ottawa, Ill., $90.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $94.60; Hays, Pa., $100.10; Joliet, Rockdale, Ill., E. Chicago, Ind., $104.50; Lehi, Utah, Los Angeles, $111.10.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $92.40.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $93.50.

BASIC BRICK

Per net ton, Baltimore or Chester, Pa. Burned chrome brick, $73-$78; chemical-bonded chrome brick, $77-$82; magnesite brick, $99-$104; chemical-bonded magnesite, $88-$93.

MAGNESITE

Per net ton, Chewelah, Wash. Domestic deadburned, ⅜" grains; bulk, $36.30; single paper bags, $41.80.

DOLOMITE

Per net ton. Domestic, burned bulk; Bonne Terre, Mo., $12.15; Martin, Millersville, Nario, Clay Center, Woodville, Gibsonburg, Bettsville, O., Bilimeyer, Plymouth Meeting, Blue Bell, Williams, Pa., Millville, W. Va., $13.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports.

After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950 in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56.62% concentrates contract	17.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$38-$39
Domestic scheelite, del.	nominal

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$19.50
45% no ratio	20.00
48% no ratio	27.00
50% no ratio	28.00-28.50

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $70, Palmerton, Pa.; $71, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l., packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lot 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max, 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 29c per lb of metal; packed, 29.75c; ton lot 31.25c; less ton lot 33.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb, 30c; 40,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%,

(*Please turn to page* 108)

Control Over Metals Tightens

Government is forced to extend restrictions on civilian use of nonferrous metals as military and stockpiling needs continue to expand. Consumers seek substitutes

New York—Restrictions on distribution and use of nonferrous metals are snowballing. As war production needs expand and purchases by the government for stockpiling increase, supplies available for civilian uses are shrinking rapidly.

At the final session of the 81st Congress, a $20 billion defense appropriation bill was passed, including nearly $1.9 billion for stockpiling strategic materials. This action was taken in the face of strong opposition by many metal producers who believe present consuming needs are more urgent than accumulation of reserves.

Frank L. Valenta, president, Natural Resources Fund Inc., this city, had urged a "stockpiling holiday for copper and zinc" for six months. He said the present stockpile of copper amounts to about 400,000 tons and that the 1951 program calls for storing of between 300,000 and 500,000 additional tons, or from 15 to 25 per cent of the world output.

Mr. Valenta declared the government's stockpile of zinc already has reached between 500,000 and 600,000 tons, or more zinc than was consumed in direct war effort in any single year of the 1942-1945 war period. The 1951 program calls for storing another 200,000 tons, almost 20 per cent of the amount of zinc currently used in the United States.

A copper fabricator, urging adoption of a "sensible" stockpiling policy, pointed out that "although we started the last war without a stockpile, there was never a shortage of copper for military needs."

Excessive accumulation of any mineral listed by Defense Minerals Administration, Interior Department, as being scarce is unlawful. The list covers more than 50 minerals.

Copper—National Production Authority banned the use of copper, effective Mar. 1, in more than 300 civilian products. The order prohibits copper from being used except when it serves a functional purpose and where no practical substitute is available. Articles in which no form of copper may be used fall in these categories: Builders' hardware, building materials, burial equipment, clothing and dress equipment, furnishings, furniture and fixtures, miscellaneous hardware, household electrical appliances, jewelry and novelties, motor vehicle trim, passenger transportation equipment and a host of miscellaneous items.

Stocks of refined copper held by fabricators fell to a postwar low in November, but use of the metal and new orders booked in that month were high. Brass mills, wire mills and foundries during November shipped products containing 128,790 tons of new refined copper compared with 128,202 tons of the metal used in products shipped in October. Tonnages of copper consumed in both months would have been much larger had the metal been available. Because the amount of copper received by manufacturers of copper goods fell short of the amount consumed, their supplies on hand were reduced 14,973 tons to 277,590 tons at the end of November. This was the smallest supply of refined copper held since early in World War II.

Lead—Many producers of civilian goods who have been unable to obtain sufficient tonnages of copper, zinc, tin, aluminum and other scarce metals to cover their needs are seeking large tonnages of lead for use as a substitute. Supplies of lead are becoming increasingly tight and are being allocated by producers, assigning top priority to national defense requirements. In addition to this sharp increase in domestic demand, inquiry on the export market is sharply higher.

Brass, Bronze Ingots—Wider uses of lead compositions in brass alloys are expected. Cutbacks in quantities of tin announced by NPA hit some brass ingot refiners with restrictions based upon a low period of bronze ingot production. Wherever possible, lead-content brasses will be substituted for bronzes. A leading maker of brass and bronze ingots reduced prices up to 2 cents a pound.

STEEL'S Metal Price Averages for Dec., 1950

(Cents per pound)

Electrolytic Copper, del. Conn.	24.50
Lead, St. Louis	16.80
Prime, Western Zinc, E. St. Louis	17.50
Straits Tin, New York	144.74
Primary Aluminum ingots, del.	19.00
Antimony, f.o.b. Laredo, Tex.	32.00
Nickel, f.o.b. refinery	49.40
Silver, New York	80.00

Use of Cadmium Restricted

Washington—National Production Authority limited the use of cadmium to a list of essential military and civilian products, effective as of Jan. 1. The order contains several broad provisions which might allow use of cadmium in some items not specifically on the permitted list. For instance, use of the metal is allowed on moving parts which cannot use a substitute. Although most nuts, bolts and screws are barred using cadmium plating, another broad provision says that "threaded fittings" of grey and malleable iron can use cadmium if no other finish will provide "required corrosion protection and tolerance." The order limits inventories of cadmium to a 30-day supply.

Cobalt Allocations Ordered

Washington—Every purchase of more than 25 pounds of cobalt, including defense orders, will require approval of National Production Authority beginning Feb. 1. In January, civilian users are allowed up to one-third the amount of cobalt they used in January, 1950. Order M-10, as amended, places the metal under virtually complete allocation, prohibits certain uses and limits inventories.

Nickel Product Prices Drop

New York—Prices established by International Nickel Co. Inc., this city, on Dec. 13 for mill products produced in the United States have been rolled back by amounts ranging from ½-cent to 5 cents per pound. The reductions for regular monel products in sheet and rod forms are 1 cent and for all forms of similar rolled pure nickel products 2.50 cents per pound. The revised products are retroactive to Dec. 13. This action was taken to comply with the nation-wide voluntary price freeze requested by Economic Stabilization Agency on Dec. 18.

On Dec. 13, International Nickel Co. of Canada raised the price of primary nickel sold in Canada or exported to other world markets by 2.50 cents per pound. The price rise remains unchanged.

Aluminum Output Climbing

Louisville—Aluminum production will climb in 1951 to over 1.6 billion pounds, within 10 per cent of the peak year during World War II, Richard S. Reynolds Jr., president, Reynolds Metals Co., this city, predicts. Primary aluminum output has increased so sharply during recent years that the 1951 production will be double that in 1946. Further expansion of capacity, already agreed upon, will enable the three leading producers to achieve a rate of 2.2 billion pounds a year in 1952, a 50 per cent jump over 1950.

Special care must be exercised in making the shift from civilian to military production, Mr. Reynolds warned, to avert the loss of skilled manpower at key aluminum fabricating mills. A sudden stoppage of civilian operations at these mills, before there is any indication of what military orders will fill the gap, can only lead to shutdowns and unemployment.

Aluminum Restrictions Eased

Washington—NPA eased for the second time its order cutting back civilian consumption of aluminum. Makers of "strictly functional" or moving parts can use during March 75 per cent of the aluminum they used for that purpose during an average month in the first half of 1950. This action was needed to maintain production and permit additional time for finding substitutes.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c, Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 43.25c; 80-10-10 (No. 305) 35.00c; No. 1 yellow (No. 405) 25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.60c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 31.00-32.00c; No. 12 foundry alloy (No. 2 grade) 30.50-31.00c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.50-33.00c; grade 2, 30.75-31.50c; grade 3, 30.00-30.50c; grade 4, 29.50-30.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, spot, prompt, 157.00c; Jan. 156.00c; Feb. 155.00c; Mar. 154.00c; Apr. 153.00c.

Antimony: American 99-99.8% and over but not meeting specifications below 32.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 32.50c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%; Chinese 34.00c; English, 32.75c; Belgian, 32.75c, duty paid, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.15c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

Mercury: Open market, spot, small lots, New York, $150-$158, per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 80.00c per oz.

Platinum: $90-$98 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 39.93-41.68; yellow brass 36.86-38.38; commercial bronze, 95%, 39.91-41.61; 90%, 39.48-41.13; red brass, 85%, 38.54-40.14; 80%, 38.12-39.67; best quality, 39.15; nickel silver, 18%, 50.57-51.91; phosphor-bronze grade A, 5%, 58.49-60.20.

Rods: Copper, hot-rolled 35.78-37.53; cold-drawn 37.03-38.78; yellow brass free cutting, 31.24-32.63; commercial bronze, 95%, 39.60-41.30; 90%, 39.17-40.82; red brass 85%, 38.23-39.88; 80%, 37.81-39.36.

Seamless Tubing: Copper 39.97-41.72; yellow brass 39.97-41.29; commercial bronze, 90%, 42.14-43.79; red brass, 85%, 41.45-43.65; 80%, 42.58.

Wire: Yellow brass 37.15-38.57; commercial bronze, 95%, 40.20; 90%, 39.77-41.42; red brass, 85%, 38.83-40.43; 80%, 38.41-39.96; best quality brass, 39.44.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-29.42, l.c.l. 29.17-29.92, 100,000 lb lots 28.545-29.295; weatherproof, f.o.b. eastern mills, c.l. 29.60, l.c.l. 30.10, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	—Hexagonal— 17S-T4
0.125	52.0	....	....
0.156-0.188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq. ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb. 55.00-62.00c; 25 to 99 lb. 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

DAILY PRICE RECORD

1950	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Jan. 4	24.50	16.80	17.50	157.00	19.00	32.00	50.50	80.00
Jan. 3	24.50	16.80	17.50	153.00	19.00	32.00	50.50	80.00
Jan. 2	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
Dec. Avg.	24.50	16.80	17.50	144.74	19.00	32.00	49.40	80.00
Dec. 29-30	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
Dec. 28	24.50	16.80	17.50	151.00	19.00	32.00	50.50	80.00
Dec. 22-27	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
Dec. 21	24.50	16.80	17.50	148.50	19.00	32.00	50.50	80.00
Dec. 20	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
Dec. 19	24.50	16.80	17.50	155.00	19.00	32.00	50.50	80.00
Dec. 18	24.50	16.80	17.50	147.00	19.00	32.00	50.50	80.00
Dec. 15-16	24.50	16.80	17.50	146.00	19.00	32.00	50.50	80.00
Dec. 14	24.50	16.80	17.50	142.00	19.00	32.00	50.50	80.00

NOTE: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 37.69c; oval 37.19c; cast 37.375c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 61.9c, under 1000 lb 63.9c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 70.00c; 10,000 to 30,000 lb, 68.00c; 3000 to 10,000 lb, 71.00c, 500 to 3000 lb, 72.00c; 100 to 500 lb, 74.00c; under 100 lb, 77.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl. 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Munts metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; composition red brass 22.00-22.50; radiators 17.25; heavy yellow brass 17.00.

* Nominal.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 19.50.

* Nominal

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 20.00; No. 2 18.50; light copper 17.25; No. 1 composition red brass 17.00-17.50; No. 1 composition turnings 16.50-17.00; mixed brass turnings 12.00-12.50; new brass clippings 17.50-18.00; No. 1 brass rod turnings 16.00-16.50; light brass 11.00; clean heavy yellow brass 14.50-15.00; new brass rod ends 16.50-17.00; auto radiators 14.50-15.00; cocks and faucets, 15.50-16.00; brass pipe 17.00-17.50.

Lead: Heavy 14.50-14.75; battery plates 8.75-9.00; linotype and stereotype 14.50-14.75; electrotype 12.75-13.00; mixed babbitt 12.25-12.50.

Zinc: Old zinc 11.00-11.25; new die cast scrap 10.75-11.00; old die cast scrap 8.00-8.25.

Tin: No. 1 pewter 63.00-65.00; block tin pipe 90.00; No. 1 babbitt 58.00-60.00.

Aluminum: Clippings 2S 19.00-19.50; old sheets 15.50-16.00; crankcase 15.50-16.00; borings and turnings 12.00-12.50.

IRON AND STEEL SCRAP

Consumers prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Jan. 4, 1951; gross tons
Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Jan. 4	$45.50
Dec. 28	45.50
Dec. 1950	45.50
Jan. 1950	26.93
Jan. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$46.50
No. 2 Heavy Melt.	44.50
No. 1 Busheling	46.50
No. 1 Bundles	46.50
No. 2 Bundles	43.50
Heavy Turnings	47.00-48.00
Machine Shop Turnings	38.50
Mixed Borings, Turnings	38.50
Short Shovel Turnings.	40.50
Cast Iron Borings	39.50-40.50
Low Phos. Steel	56.00-57.00

Cast Iron Grades

No. 1 Cupola Cast	57.00-58.00
No. 1 Machinery Cast.	67.00-68.00
Charging Box Cast	55.00-56.00
Heavy Breakable Cast.	54.00-55.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.50
Rails, Random Lengths	64.00-65.00
Rails, 2 ft and under.	68.00-69.00
Rails, 18 in. and under	69.00-70.00
Railroad Specialties	64.00-65.00

CLEVELAND

(Delivered Consuming Plant)

No. 1 Heavy Melt. Steel	$45.50-46.00†
No. 2 Heavy Melt. Steel	43.50-44.00†
No. 1 Busheling	45.50-46.00†
No. 1 Bundles	45.50-46.00†
No. 2 Bundles	40.00-42.00
Machine Shop Turnings	37.50-38.00
Mixed Borings, Turnings	39.00-40.00
Short Shovel Turnings.	39.00-40.00
Cast Iron Borings	39.50-40.00
Low Phos.	48.00-48.50

Cast Iron Grades

No. 1 Cupola	65.00-66.00
Charging Box Cast	53.00-54.00
Stove Plate	55.00-56.00
Heavy Breakable Cast.	55.00-56.00
Unstripped Motor Blocks	44.00-45.00
Brake Shoes	50.00-51.00
Clean Auto Cast	65.00-66.00
Burnt Cast	46.00-47.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-46.50
R.R. Malleable	72.00-73.00
Rails, 3 ft and under.	70.00-71.00
Rails, 18 in. and under	71.00-72.00
Rails, Random Lengths	64.00-65.00
Cast Steel	58.00-59.00
Railroad Specialties	60.00-61.00
Uncut Tires	60.00-61.00
Angles, Splice Bars	65.00-66.00

† Plus applicable springboards

VALLEY

No. 1 Heavy Melt. Steel	$46.00-46.50†
No. 2 Heavy Melt. Steel	44.00-44.50†
No. 1 Bundles	46.00-46.50†
Facty. Prod. Bundles.	46.00-46.50†
No. 2 Bundles	40.50-42.50
Machine Shop Turnings	38.00-38.50
Short Shovel Turnings.	40.00-40.50
Cast Iron Borings	40.00-40.50
Low Phos.	48.50-49.00

† Plus applicable springboards

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-46.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	$45.00
No. 2 Heavy Melt. Steel	43.00
No. 1 Busheling	43.00
No. 1 Bundles	45.00
No. 2 Bundles	42.00
Short Shovel Turnings.	39.00
Machine Shop Turnings	37.00
Mixed Borings, Turnings	37.00
Low Phos. Punchings and Plate, elec. fur. grade	51.00
Low Phos. Plate, 5 ft. & Under	51.00
Elec. Furnace Bundles.	48.00-49.00
Heavy Turnings	45.00
No. 1 Chemical Borings	45.00
Knuckles and couplers.	56.00-58.00
Steel car wheels	56.00-58.00

Cast Iron Grades

No. 1 Cupola Cast	54.00-55.00
No. 1 Machinery Cast.	58.00-60.00
No. 1 Yard Cast	52.00-53.00
Charging Box Cast	54.00-55.00
Heavy Breakable Cast.	54.00-55.00
No. 1 Wheels	70.00*
Malleable	*70.00-72.00*

* Nominal

CINCINNATI

No. 1 Heavy Melt. Steel	$46.00
No. 2 Heavy Melt. Steel	44.00
No. 1 Busheling	46.00
No. 1 Bundles	46.00
No. 1 Black Bundles	46.00
Machine Shop Turnings	*33.00*
Short Shovel Turnings	*34.00*
Mixed Borings, Turnings	*33.00*
Cast Iron Borings	34.00

Cast Iron Grades

No. 1 Cupola Cast	70.00
Charging Box Cast	60.00
Stove Plate	55.00
Heavy Breakable Cast	56.00
Unstripped Motor Blocks	42.00
Brake Shoes	37.00
Clean Auto Cast	70.00
Drop Broken Cast	72.50
Low Phos., 18 in. and under	62.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00
R.R. Malleable	64.00
Rails, Rerolling	65.00
Rails, Random Lengths	65.00
Rails, 18 in. and under	72.50

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$38.25-39.00
No. 1 Bundles	*40.25-50.00*
No. 2 Bundles	37.25-37.50
No. 1 Busheling	40.25-45.00
Machine Shop Turnings	32.25-33.00
Forge Flashings	40.25-45.00
Short Shovel Turnings.	34.25-35.00
Cast Iron Borings	34.00-35.00
Punchings & Plate Scrap	42.75-46.00

Cast Iron Grades

No. 1 Cupola Cast	59.00-60.00
Heavy Breakable Cast.	48.00-50.00
Clean Auto Cast	62.00-64.00

BUFFALO

No. 1 Heavy Melt. Steel	$44.50-45.25
No. 2 Heavy Melt. Steel	42.50-43.25
No. 1 Busheling	42.50-43.25
No. 1 Bundles	43.50-44.25
No. 2 Bundles	41.50-42.25
Machine Shop Turnings	36.50-37.25
Mixed Borings, Turnings	36.50-37.25
Cast Iron Borings	36.50-37.25
Short Shovelings	38.50-39.25
Low Phos.	48.25-49.00

Cast Iron Grades

No. 1 Cupola	54.00-55.00
No. 1 Machinery	59.00-60.00
Malleable	nominal

Railroad Scrap

Rails, 2 ft and under.	60.00-61.00
Rails, random size	55.00-56.00
Railroad Specialties	55.00-56.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$39.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	38.00-39.00
No. 1 Bundles	39.00
No. 2 Bundles	36.00
Mixed Borings, Turnings	31.00
Machine Shop Turnings	31.00
Short Shovel Turnings.	33.00
Punchings & Plate Scrap	41.50
Low Phos. Plate, 5 ft & under	41.50
Elec. Furnace Bundles.	41.50

Cast Iron Grades

No. 1 Cupola Cast	47.00-48.00
No. 1 Machinery	49.00-50.00
Charging Box Cast	44.00-45.00
Heavy Breakable	44.00-45.00
Unstripped Motor Blocks	41.00-42.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$35.67
No. 2 Heavy Melt. Steel	33.67
No. 1 Bundles	35.67
No. 1 Busheling	*35.67*
Machine Shop Turnings	27.67
Mixed Borings, Turnings	27.67
Short Shovel Turnings	*29.67*
Bar Crops and Plate	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Chemical Borings	*33.00-34.00*

Cast Iron Grades

No. 1 Cupola Cast	*46.00-47.00*
Mixed Cast	*44.00-45.00*
Heavy Breakable Cast	*43.00-43.50*
Stove Plate	42.00-43.00

CHICAGO

No. 1 Heavy Melt. Steel	$45.00
No. 2 Heavy Melt. Steel	43.00
No. 1 Bundles	45.00
No. 2 Bundles	42.00
Machine Shop Turnings	35.00-36.00
Mixed Borings, Turnings	35.00-36.00
Short Shovel Turnings.	37.00-38.00
Cast Iron Borings	36.00-37.00
Low Phos.	52.00-54.00
Elec. Furnace Bundles.	46.00-48.00
Heavy Turnings	41.00-42.00
Cut Structurals	50.00-51.00

Cast Iron Grades

No. 1 Cupola Cast	62.00-64.00
Clean Auto Cast	65.00-66.00
No. 1 Wheels	*60.00-62.00*
Stove Plate	40.00-50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-47.00*
Malleable	73.00-75.00
Rails, Rerolling	66.00-68.00*
Rails, Random Lengths	59.00-60.00
Rails, 2 ft. and under.	68.00-69.00
Rails, 18 in. and under	69.00-70.00
Railroad Specialties	*58.00-59.00*
Angles, Splice Bars	*59.00-60.00*

* Brokers' buying price.

BIRMINGHAM

No. 1 Heavy Melt. Steel	$43.50
No. 2 Heavy Melt. Steel	41.50
No. 1 Busheling	43.50
No. 2 Bundles	40.50
Machine Shop Turnings	35.50
Mixed Borings, Turnings	35.50
Short Shovel Turnings.	37.50
Cast Iron Borings	28.00
Bar Crops and Plate	46.00-47.00
Cut Structurals	46.00-47.00

Cast Iron Grades

No. 1 Cupola Cast	59.00-60.00
Stove Plate	59.00-60.00
No. 1 Wheels	nominal

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.50
R.R. Malleable	nominal
Rails, Rerolling	60.00-61.00
Rails, 2 ft and under.	65.00-66.00
Angles and Splice Bars.	59.00-60.00

ST. LOUIS

No. 1 Heavy Melt. Steel	*$46.00-47.00*
No. 2 Heavy Melt. Steel	41.50-42.50
No. 1 Bundles	46.00-47.00
No. 2 Bundles	*40.50-41.50*
Machine Shop Turnings	33.00-34.00
Short Shovel Turnings.	35.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	*58.00-60.00*
Charging Box Cast	*51.00-53.00*
Heavy Breakable Cast.	*56.00-57.00*
Brake Shoes	56.00-58.00
Clean Auto Cast	65.00-67.00
Burnt Cast	*53.00-54.00*

Railroad Scrap

R.R. Malleable	*63.00-65.00*
Rails, Rerolling	66.00-68.00
Rails, Random Lengths	59.00-61.00
Rails, 2 ft and under.	65.00-67.00
Uncut Tires	*57.00-58.00*
Angles, Splice Bars	66.00-68.00
Railroad Specialties	*60.00-62.00*

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$30.00
No. 2 Heavy Melt. Steel	28.00
No. 1 Bundles	30.00
No. 2 Bundles	28.00
No. 3 Bundles	25.00
Machine Shop Turnings	16.00
Low Phos. Electric	45.00

Cast Iron Grades

No. 1 Cupola Cast	*43.00-45.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
Rails, Random Lengths	30.00

SEATTLE

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
No. 1 Busheling	25.50-26.00
Nos. 1 & 2 Bundles	25.50-26.00
No. 3 Bundles	22.00
Machine Shop Turnings	20.00
Mixed Borings, Turnings	20.00
Punchings & Plate Scrap	40.00-44.00
Cut Structurals	40.00-44.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Heavy Breakable Cast.	38.00-40.00
Stove Plate	36.00-38.00
Unstripped Motor Blocks	33.00-35.00
Malleable	33.00-35.00
Brake Shoes	35.00
Clean Auto Cast	40.00
No. 1 Wheels	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	29.00
Railroad Malleable	35.00
Rails, Random Lengths	29.00-30.00
Angles and Splice Bars	29.00-30.00

LOS ANGELES

(Delivered prices)

No. 1 Heavy Melt. Steel	$30.00
No. 2 Heavy Melt. Steel	28.00
No. 1 Bundles	*30.00*
No. 2 Bundles	*28.00*
No. 3 Bundles	*25.00*
Machine Shop Turnings	16.00
Punchings & Plate Scrap	*40.00*

Cast Iron Grades

No. 1 Cupola Cast	*45.00-48.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	nominal
Rails, Rerolling	*48.00*

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$30.00
No. 1 Bundles	30.00
Mechanical Bundles	28.00
Mixed Steel Scrap	25.00
Mixed Borings, Turnings	23.00
Rails, Remelting	30.00
Rails, Rerolling	33.00
Busheling	24.50
Bushelings new factory, prep'd	28.00
Bushelings new factory, unprep'd	23.00
Short Steel Turnings	23.00

Cast Iron Grades*

No. 1 Machinery Cast	*50.00*

* F.o.b. shipping point.

SCRAP

for your every requirement

LURIA BROTHERS AND COMPANY, INC.

CONSULT OUR NEAREST OFFICE FOR THE PURCHASE AND SALE OF SCRAP

PLANTS

LEBANON, PENNA.
READING, PENNA.
DETROIT (ECORSE), MICHIGAN
MODENA, PENNA.
PITTSBURGH, PENNA.
ERIE, PENNA.

MAIN OFFICE

LINCOLN-LIBERTY BLDG.
Philadelphia 7, Penna.

OFFICES

BIRMINGHAM, ALA.
Empire Building

CHICAGO, ILLINOIS
100 W. Monroe St.

HOUSTON, TEXAS
1114 Texas Av Bldg.

PITTSBURGH, PA.
Oliver Building

BOSTON, MASS.
Statler Building

CLEVELAND, OHIO
1022 Midland Bldg.

LEBANON, PENNA.
Luria Building

PUEBLO, COLORADO
334 Colorado Bldg.

BUFFALO, N. Y.
Genesee Building

DETROIT, MICHIGAN
2011 Book Building

NEW YORK, N. Y.
100 Park Avenue

READING, PENNA.
Luria Building

ST. LOUIS, MISSOURI
2110 Railway Exchange Bldg.

SAN FRANCISCO, CALIFORNIA
Pacific Gas & Elec. Co., Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Berman

Sheets, Strip . . .

Sheet and Strip Prices, Page 93 & 94

Cleveland — Little open tonnage will be available for the trade this month, production being taken up by the overflow from fourth quarter and rated commitments. Producers expect to clear up the carryover before end of the month but they hold out little promise of any improvement in supply conditions in succeeding months. February allotments are smaller and with emergency needs rising further cuts in quotas on unrated accounts are indicated. At the moment all the signs point to intensification of acute supply conditions in the light, flat-rolled products. However, in some quarters the view is expressed that cutbacks in civilian goods production resulting from acute shortages of nonferrous metals will shortly be reflected in much easier general steel supply conditions.

New York—While sheet sellers are booked through the current quarter on silicon sheets for non-rated account because of the longer processing time, few, if any, have yet taken such action on the major grades of carbon sheets except for preference work. It probably will be another week before mills set up their schedules for March on ordinary civilian work and when the time comes it is likely there will be further curtailment in tonnage available for this purpose. On DO-rated account producers are booked well into second quarter on the basis of minimum percentage quotas set up by government regulation. Actually some mills are accepting more DO-rated work than the minimum quotas call for. Stainless steel is moving almost entirely into defense work, except some of the plain chrome grades.

Boston—Rated orders for hot and cold-rolled, notably narrow strip, are extended well through second quarter. Backlogs are unbalanced under current limitation maximums. Wide range of prices for cold-rolled strip prevails without any influence on demand. Spread at New Haven is $14 per ton on low carbon. Price increases by nonintegrated mills in some cases were made after Dec. 1 when hot strip was advanced.

Philadelphia—Non-rated sheet consumers appear reconciled to further cuts in their allocations for March once schedules are finally set up by the mills within the next week or so. Defense work is taking an increasing amount of tonnage. Even though March is a longer month than February, it seems likely that sheet supply for commercial needs will be further reduced.

Pittsburgh—Weirton Steel Co. has issued a new extra card covering electrolytic zinc coated sheets. Revisions include increase of $3 to $7 per ton in gage and width extras for 26 gage and heavier ;$4 per ton for special killed steel quality; $5 for restricted thickness tolerance and $6 for stretcher leveled standard of flatness extra.

Item quantity brackets were augmented to include larger quantities just under 20,000 pounds, while quantity brackets under 2000 pounds were deleted and extras were increased $4 to $6 per ton.

Complete revision in packaging extras also was incorporated in the card in line with upward adjustments previously reported on hot and cold-rolled sheets.

Sheet sellers are booked through March and beyond on rated tonnage to the percentage maximum they are obliged to accept. Most interests have been forced to devote all of January output, and about half of February to yearend carryover tonnage.

Cincinnati — Steadily increasing sheet tonnage on priorities is lowering the volume for non-rated consumers. Despite announced curtailments in some end-use production lines, cutbacks are not reflected in sheet demand. A hot-strip mill at Middletown of Armco Steel Corp. is being revamped.

Chicago — Cutbacks being announced in the automobile, appliance and other industries are only a forerunner of more and worse to come. They are forced by the quantities of steel that can be acquired and definitely do not reflect declining consumer demand. Sheets and strip are the shortest of all steel products and it is to them that cutbacks are geared. January production of these items goes entirely to carryover catchup. February schedules leave disappointing tonnage for civilian distribution and in only a few days producers will be working out March quotas. From all indications free steel in the latter month will be considerably less than for February.

Plates . . .

Plate Prices, Page 93

Boston — Shipyards in need of work look for support in the authorization of 50 fast cargo ships. Fabricating shops are also expected to benefit. Thus far subcontracting business involving plates has been small. Tonnage required for these ships will cut into civilian allocations.

New York—Most plate sellers will not accept nonrated tonnage for March before the middle of this month, at which time they will make allocations of such specifications as have already been received and are yet to come in. Specifications will be much heavier than the mills will be able to handle. Some producers claim their free tonnage in March will be even less than in February. Various mills have accepted DO-rated orders for shipment well into the second quarter, although they have taken no formal action on programmed tonnage for that period.

Philadelphia—While March will have two more working days, some plate producers doubt they will have more tonnage to supply against nonrated orders than in February. DO-rated orders are expanding and in addition some special directives are beginning to appear. These are expected to cut into March allocations of nonrated tonnage despite the fact more strip plate will be available by that time.

Pittsburgh — Yearend carryover tonnage varied considerably among plants and also between sheared and universal mill plates, the overflow ranging 3 to 6 weeks. January rated tonnage will amount to between 20 and 30 per cent of total production of some producers. Nearly the entire output of the mills is on a rated basis among those interests that recently started producing light plates on strip mills. Fabricators are reconciled to continued diminishing supply throughout 1951 for nondefense use. Dravo Corp. recently was awarded a contract by U. S. Steel Co. for a twin-screw, diesel-propelled towboat, making the seventh such boat placed with Dravo in the past six months.

Seattle — Scarcity of plates is cramping the smaller shops lacking defense orders. In some cases operations have slowed perceptibly. Backlogs are low. Some unstated contracts for secret military installations have been placed.

Semifinished Steel . . .

Semifinished Prices, Page 93

San Francisco—Bethlehem Pacific Coast Steel Corp. now is producing forging quality carbon steel billets in a variety of sizes. The product is being produced at the company's plants in South San Francisco, Los Angeles and Seattle.

Steel Bars . . .

Bar Prices, Page 93

New York—Producers of hot carbon bars generally have accepted orders, non-rated as well as rated, for shipment through February, and a few through March as well. Actually by the middle of this month it is believed most all producers will have set up their schedules for the entire quarter, subject to possible last minute changes in order to handle special emergency work. So far there have been relatively few DO orders, but this situation is expected to shift fairly rapidly within the next few weeks as defense work becomes more accelerated. Cold carbon bar producers are booked well into second quarter, but they are moving with increasing caution because of uncertainty as to how much hot stock they will be able to obtain as time goes on, except for DO rated orders.

Boston—Forge shops account for the bulk of rated orders for carbon and alloy bars. Such volume is expanding. Carbon bar carryovers are heavy with unrated allocations reduced in proportion. February quotas will be limited by somewhat larger tonnage of DO orders. While cold-finished bar output is reduced by subnormal production of one leading district producer, several nonintegrated cold-drawing mills have better inventory on hot-rolled bars.

Pittsburgh—Demand for alloy bars exceeds supply by a wide margin, and conditions are expected to become even more critical due to scarcity of nickel and other alloying elements. In addition to increased requirements for military-end uses, sellers are faced with the probability shipments to petroleum interests and for other indirect military needs will be augmented throughout most of this year. Uncertain steel supply

435 PAGES
Fully Illustrated

Solve Your Spring Design Problems

Eliminate "rule of thumb" methods with this authoritative book on the design of all types of mechanical springs.

● Hundreds of design engineers have already discovered "MECHANICAL SPRINGS" by A. M. Wahl to be an important aid in helping them to solve their spring design problems. Why not put it to work for you?

Based on original research and practical applications, "MECHANICAL SPRINGS" has long been recognized as the outstanding work in its field. You will find it filled with information that will enable you to make preliminary calculations on the design of all types of springs: compression . . . tension . . . torsion . . . and spiral. Its practical formulas for design, plus its complete authoritative information on spring application make it an unusually valuable addition to your engineering bookshelf.

Mr. Wahl, an eminent authority on springs, and well-known for his development of the "Wahl Correction Factor," puts spring design on a rational basis. You will find that no matter what your problem . . . working stress . . . fatigue . . . buckling . . . or just plain maximum efficiency, that the use of "MECHANICAL SPRINGS" will reduce your number of spring failures due to "guesswork" as well as save you time and materials.

Free Ten Days Trial

Why not decide for yourself what a useful book this can be to you? Just fill in and mail the coupon below. It will bring you a copy of "MECHANICAL SPRINGS" by return mail. Examine the book FREE for ten days—at the end of that time send us your check for $6.—plus a few cents for postage—or return the book absolutely without obligation. To get your copy, just fill in and mail the coupon now.

This Book Thoroughly Covers:

General considerations in Spring Design—Helical Round-Wire Compression and Tension Springs — Open-Coiled Helical Springs with Large Deflection — Static and Fatigue Tests on Helical Springs and Spring Materials.— Helical Springs Under Static Loading — Fatigue or Variable Loading of Helical Springs—Practical Selection and Design of Helical Compression Springs — Buckling of Helical Compression Springs—Helical Springs for Maximum Space Efficiency — Tension Springs — Square and Rectangular-Wire Compression Springs — Vibration and Surging of Helical Springs—Initially-Coned Disk (Belleville) Springs — Initially-Flat Disk Springs—Flat and Leaf Springs—Helical Torsion Springs—Spiral Springs — Rubber Springs and Mountings—Energy Storage Capacity of Various Springs—Spring Materials.

The Penton Publishing Co.
Penton Building, Cleveland 13, Ohio

USE THIS FREE TRIAL COUPON

THE PENTON PUBLISHING COMPANY, *Book Department* 31
Penton Building, Cleveland 13, Ohio

Send me a copy of "Mechanical Springs" by A. M. Wahl

- ☐ On ten day trial for free examination, following which I will either pay for the book at $6.00 plus postage, or return it in good condition.
- ☐ C. O. D.
- ☐ Remittance enclosed* in which case the book will be sent postpaid.

Signed: _____ Title: _____

Company: _____

Address: _____

City: _____ Zone: _____ State: _____

* Orders for delivery in Ohio must be accompanied by an additional 15c to cover compulsory state sales tax.

DEPARTMENT OF TECHNOLOGY
BUFFALO PUBLIC LIBRARY

makes it increasingly difficult for coldfinishers to book additional tonnage other than rated orders. Hot-rolled bar interests note a preference for large rounds among rated orders booked for January and February production schedules. A 20 mm shell order involving around 4000 tons of coldfinished quality is pending.

Cleveland—Merchant bar sellers are booked through February and there is little chance any open tonnage will become available to the general trade over coming weeks. Expectations are March allotments to un-rated accounts will be smaller than February's though some hopes are held out for a slight easing in tight supply conditions before end of first quarter as result of cutbacks in civilian goods production. Alloy bar demand is extremely heavy, and all of it is not coming from military and related account. Machine tool builders and the automotive industry are reported aggressively seeking tonnage. Non-integrated cold-drawn barmakers are booked up well into the future but they are concerned as regards their ability to meet delivery schedules in view of the tight supply conditions in hot-rolled bars.

Structural Shapes . . .

Structural Shape Prices, Page 93

Philadelphia—Far extended delivery promises on fabricated steel are discouraging builders in going ahead with plans for various projects. Some larger fabricators are promising little for shipment under a year or more. Others have little to offer under 10 to 11 months. Considerable work is still being figured and as the defense program gets under greater swing more will come up for estimating. At present, shops are experiencing further curtailment in allocation of shapes and plates by the mills.

The Morrisville, Pa., steel mill project of the United States Steel Corp. will require 125,000 tons of structurals and 8000 tons of steel piling, as well as heavy quantities of reinforcing steel, pipe and other miscellaneous products.

Boston — Reflecting higher plain material and shop costs, fabricated structural steel prices are stronger. Escalator clauses in old contracts are being invoked, reducing contractors' margins where this potential increase was included in original steel estimates. Commercial construction inquiry is slackening with higher ratio of industrial building being rated, including a 700-ton warehouse, Raytheon Mfg. Co., Waltham, Mass. with six months delivery wanted on fabricated steel. Substantial volume of bridge work is yet to be advertised for contracting. A 350-ton overpass, Darien, Conn., brought out a high bid of 20.00c per pound for fabricated steel in place. Lowest total estimate included a 17.00c bid for steel.

New York — Structural bookings for the first 11 months of 1950 amounted to 2,286,821 tons, against 1,308,721 tons in the corresponding period of 1949, an increase of 75 per cent according to the American Institute of Steel Construction. November bookings were 230,020 tons, against a revised figure of 233,447 tons in October, and 103,557 tons in November of the preceding year.

November shipments were 154,640 tons, or 32 per cent greater than for the corresponding period of 1949. Shipments for the first 11 months amounted to 1,741,265 tons, slightly better than 1,718,036 tons shipped during the same period of the preceding year. October shipments have been revised to a figure of 181,050 tons.

Backlogs for the four months beginning Dec. 1, 1950 increased to 762,732 tons.

Pittsburgh—Scarcity of standard shapes and wide flange beams for non-defense use is expected to become more acute. In addition to steadily expanding direct and indirect military needs the amount of structural steel involved for currently projected steel expansion programs will be an increasingly important factor throughout this year. About 4000 tons of steel and iron are required to build a blast furnace rated at 1200 tons daily. Amount of steel necessary for facilities other than structural buildings in connection with steel mill facilities expansion is difficult to state in specific tonnage figures because of the complexity of requirements, for example, of motors, cranes, generators, finishing mills, etc.

Los Angeles—Demand for structurals is stronger. Seven-month state building program totaling $69.5 million will go out for bids. Officials say work will start on schedule—defense priorities permitting.

Seattle—Shapes are in strong demand, military projects in Alaska calling for heavy tonnages. Plans are in preparation for five steel frame shop buildings, one 400 x 100 feet, at Fort Richardson, bids to U. S. engineers, Seattle, in about 60 days. Steel is in scarce supply, particularly specifications rolled by eastern mills.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 93

Boston—One supplier quoted on but one half of approximately 700 tons steel mat reinforcement for Connecticut expressways, original No. 2 alternate, 244,257 square yards, 13 feet length. This was American Steel & Wire Co., total of $47,634.48, delivered, for but 50 per cent of wanted yardage. Demand for concrete reinforcing bars exceeds supply.

Chicago — Suppliers of reinforcing steel are amazed at the volume of new construction work coming out for bidding. It is inconceivable that many of the projects can go ahead with the steel supply situation worsening month by month. Many interests do not bother to follow inquiries other than those in which there is some possibility of providing steel should bidding be successful.

Los Angeles—Demand for reinforcing bars in 1950 was sustained by the biggest building boom in this district's history. Building valuation in Los Angeles county the past year totaled $400 million, $27 million higher than the previous record in 1948, 42.3 per cent higher than valuation in 1949.

Seattle—Mill backlogs are larger than usual at end of the year, although they are down from October. Inquiry is insistent, especially for small tonnages. Grain elevator construction in eastern Washington is active, involving considerable reinforcing bar stock. Largest reinforcing job pending, 5000 tons for Seattle's viaduct, is up for bids Jan. 9. Mills are booked through first quarter, one plant to June 30. Northwest Steel Rolling Mills, Inc., Seattle, resumed rolling Jan. 8.

Tubular Goods . . .

Tubular Goods Prices, Page 96

Pittsburgh — Gulf Oil Corp. has filed plans with petroleum defense authorities for construction of a 26-in. diameter 440-mile crude oil pipe line extending from West Texas producing area to refineries on the Gulf coast with a connection in eastern Texas to northbound crude lines serving refineries in the Ohio Valley and Great Lakes region. Construction is contemplated in late summer with completion early in 1952. Estimated main line capacity will be 300,000 barrels per day. Associated with Gulf are four other oil companies—Cities Service, Pure Oil, Sun Oil and Standard of Ohio.

Wire . . .

Wire Prices, Page 95

Cleveland—Wiremakers are booked well ahead and there is no prospect of any particular easing in supply conditions for months to come. DO and other emergency-rated business is increasing. However, bulk of mill shipments still is into regular consuming channels. Demand exceeds output by a wide margin and producers are distributing available tonnage as equitably as possible. They are keeping a close check on shipments to prevent hoarding and accumulation of supplies by speculators.

Considerable uncertainty is encountered in the trade with respect to the status of some current wire price schedules under the government's recent rollback order. Some wire makers did not put their recent increases into effect until after Dec. 1, the rollback date. Whether they will be required to rescind the advances is a moot question at the moment.

Boston — Allocations to civilian goods producers, maintained through February schedules, are expected to be reduced in some categories in March. Rated defense orders are heavier and for some products are at limitation maximums into second quarter. Manufacturers of civilian wire goods are expected to be the first to suffer reductions in quotas. Several leading industrial users will get ample tonnage due to their direct or indirect connection with armament expansion. More rated orders are appearing for aircraft.

Los Angeles — Bethlehem Pacific Coast Steel Corp. is accepting DO-rated orders for second half. Demand is unprecedented for wire products.

Tin Plate . . .

Tin Plate Prices, Page 94

Pittsburgh—Adjustments in line with the 20 per cent reduction in use of pig tin ordered by NPA have been incorporated in January and February production schedules. However, full scale adjustment is not feasible until NPA issues a restraining order on end-use of tin plate. Bulk of producers' new tin plate prices became effective Jan. 1 last, one exception being U. S. Steel Corp.'s subsidiaries which have established a Jan. 16 effective date.

Pig Iron . . .

Pig Iron Prices, Page 92

New York—Pig iron consumers report increasing stringency, although shortage of iron to date has not resulted in any important curtailment in production. Cast scrap and ferroalloys are being used in greater volume, thus offsetting the iron scarcity, but the higher price of these materials has caused some restraint in buying. Most foundries are operating full five days per week. Some are melting on Saturday. There would probably be more Saturday operations if it weren't for overtime wage rates. These higher rates appear to be a greater factor in holding back operations than stringency in raw materials. Increasing interest is being shown in foreign iron, but not too much new buying has resulted, due in part to extended delivery promises being made by some importers and the premiums asked by others who can make deliveries within the next four to five weeks.

Buffalo — Merchant iron sellers are guarding against consumers building up large inventories with production far short of meeting current demands. A feeling prevails that legal controls will be necessary as government contracts expand. Heavy movement of iron is reported to Michigan motor melters. Production holds at 100 per cent of capacity.

Philadelphia—Domestic pig iron supply is tighter, falling short of requirements. Operations at consuming plants are only being sustained through greater use of scrap and ferroalloys and imports of foreign pig iron. Close to 15,000 tons of Chilean iron, recently placed on the market, has been purchased for distribution to various consumers in this district. A shipment of Brazilian pig iron is expected in the next two weeks. This is a charcoal iron, sand cast.

Pittburgh—Raw material shortages have forced cutbacks in projected production of radiation and enamelware products, causing a proportionate reduction in orders booked among foundries serving those industries. Bulk of foundries here are operating at practical capacity and it is hoped the quickening tempo of order placements for direct and indirect military needs will take up the indicated slack in consumer goods demand. Output of foundries serving the machine tool, steel mill machinery, railroad and other basic industries will be restricted during 1951 only by the lack of adequate supplies of raw materials and manpower.

Cleveland—Merchant iron sellers are spreading the available tonnage among their customers as equitably as possible. As a result, while demand is considerably in excess of supply, no foundry shutdowns for lack of iron are reported. Only a relatively small proportion of the tonnage moving into consumption is against DO ratings. However, steady increase in emergency demands is indicated over coming weeks giving rise to talk in the trade of possible early application of strict government controls on supply and distribution.

Cincinnati—Shipments of merchant pig iron into this district last month fulfilled voluntary allocations. Foundry suspensions are being avoided through liberal use of scrap.

Chicago—Foundries are pressing for all the pig iron they can get and are meeting no success in having their allocations increased. Demand for iron considerably exceeds production with the result suppliers are obliged to maintain a close check on quotas. Of the district's 42 blast furnaces 38 are operating, one less than a month ago. Interlake Iron Corp. blew out its South Chicago A stack on Dec. 18 for repairs which will take from 45 to 60 days.

St. Louis—Pressure for pig iron deliveries mounts as the gap between

600 TONS OF PAPER PER DAY AT 1500 FT.-A-MINUTE

Calls for faultless control of oil pressure to press rolls

300 ft. long, 17 ft. high and weighing 3,350,000 lbs., this mammoth Dryer, only one segment of a complete Rice Barton Corporation paper making machine, is constructed to produce 600 tons of paper per 24-hr. day at about 1500 ft. per minute.

Such round-the-clock production, 7 days a week, leaves no room for "unscheduled" down-time, for an hour's hold-up represents at least 25 tons lost from daily production.

Vital to continuous operation are the Hydraulic Control Panels . . . depended on for the critical function of controlling the oil pressure ("holding-down" pressure) to the paper machine press rolls. And guarding the condition of the hydraulic oil, to assure trouble-free performance of these panels, thereby helping to guard the service reputation of the entire Rice Barton paper machine, are compact Ross Type BCF Exchangers.

As small as they are, as relatively minute in cost as they are to the value of the whole machine, they are relied upon for the giant responsibility of maintaining a constant supply of hydraulic oil at most effective temperatures. Otherwise, pump slippage, internal leakage and malfunction of precision-made controls could easily inflict production losses many times the cost of the Ross units.

ROSS EXCHANGERS

Whether *your* temperature control problems apply to hydraulic fluid, lube oil or jacket water, like other primary equipment makers *you'll* find fully standardized Ross Type BCF Exchangers your most practical solution. *Full design data in Bulletin 1.1K1. Write.*

ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corp., 1431 West Ave., Buffalo 13, N. Y. In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

Serving home and industry— AMERICAN-STANDARD • AMERICAN BLOWER CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

supply and demand widens. Demand for castings is bringing even the smallest foundries to capacity operations. Pig shipments are dropping farther behind each month.

Seattle—Foundries are in receipt of some defense work and their order backlogs are rising. As a result demand for pig iron is pressing. Considerable foreign iron is enroute to the North Pacific area but sellers are refusing to make new commitments on future prices, accepting new business with reservations.

Scrap . . .

Scrap Prices, Page 100

Pittsburgh—Little activity in scrap transactions is noted with buyers and sellers expecting government action on price controls. Dealers are completing shipments on old orders as rapidly as possible. Trade anticipates that the price ceilings as finally adopted will represent a roll-back from current levels to anywhere from $40 to $45 for No. 1 heavy melting steel. Price relationships for other grades are seen adhering closely to that prevailing under OPA. Such action will force a substantial reduction in present quotations for cast grades and railroad specialties. The railroads have been asked by ESA to notify the agency, at least 7 days ahead of the date future lists will be offered, of the grades and prices expected to obtain for each. Some weakness in prices for railroad specialties already has developed. Crushers also contend they have been able to purchase local machine shop turnings for $37.

Philadelphia—While scrap demand continues strong in most grades, the pressure has eased pending price discussions in Washington this week. General belief is that there will be a rollback in prices, affecting all major grades, and cast and specialty grades in particular. A system somewhat similar to the old OPA is expected to be announced shortly, with bases on steel scrap possibly set up at Kansas City, Mo., and Houston, Tex., in addition to those which prevailed during World War II. Due to the large and scattered number of cast consumers, prices on cast grades likely will be set up on an f.o.b. shipping point basis as was previously the case.

Prices on malleable scrap have eased recently to $70-$72 and on No. 1 cast wheels to $68. No. 1 yard cast, on the other hand, is higher at $53. All other grades are unchanged.

New York—Pending the outcome of scrap price discussions in Washington—discussions which will continue into this week—brokers' buying prices here are unchanged. Meanwhile, there are various reports as to the extent of rollbacks. In view of the probability that there will be rollbacks, consumers are moving a shade less actively in the placing of business, especially where inventories warrant. However, there is still substantial buying.

Chicago—The scrap market here lacks the pressure of recent weeks with many consumers following a watch and wait policy. Prices paid for certain grades continue to reflect the easier tone which developed two weeks ago. The slackening is attributed to the fact that government price control seems inevitable and in the not too distant future with the result melters of cast grades and specialties choose not to purchase beyond current needs. Demand for turning grades is off markedly. Collection and preparation of scrap has been slowed considerably by recent heavy snows and severe weather. However, shipments of steelmaking grades are moving to mills in fairly substantial volume.

Cleveland—Scrap prices are holding steady here pending outcome of discussions now under way in Washington between government officials and representatives of the scrap producing, distributing and consuming interests. Consensus in the trade here is that a downward adjustment likely will be made within the next 30 days. Steel mills and foundries apparently are in a satisfactory supply position with shipments coming in on schedule. In view of the present price outlook, there is no incentive for withholding tonnages.

Buffalo—The scrap trade marks time as both sides await some definite stand on controls. Dealers are shipping against old orders as new business is deferred. Mild weather spurred movement of material this past week.

Detroit — Unallocated scrap continues in good demand at prices substantially above the formula. Electric furnace operators are paying as much as $50 delivered for No. 1 bundles. Bulk of automotive scrap is taken at the formula level but enough tonnage moves at higher prices and is of such importance to continuing operation of electric furnaces and foundries that it cannot be ignored pricewise. Trading at the higher level is exceedingly active. Operations are declining among automotive and appliance foundries but as yet no slackening in demand for good cast material is noticed.

Cincinnati — In general, formula prices are being maintained in the district iron and steel scrap market, and material is coming out freely. Cast prices are firm despite the discussions on possible rollbacks. However, demand is off, possibly a reflection of seasonal influences. Foundries' stocks of scrap are fair.

St. Louis—Cast scrap quotations have softened markedly in anticipation of a rollback. Dealer stocks are low, but tonnage on hand is going begging for the first time in months. Rail scrap, the other item believed here to be in for early controls, is steady. The Frisco road withdrew around 2000 tons. Heavy melting steel is steady with practically no buying last week. Shipments to this district are holding up well.

Los Angeles—Confusion and uncertainty rule the scrap market. Prices registered gains ranging from $1 to $3. No. 1 bundles are up $2 to $30, No. 2 bundles $2 to $28. No. 3 bundles rose $2.50 to $25. Punchings and plate scrap advanced $1 to $40 and rerolling rails, now $48, are up $3. Foundry scrap is in good supply.

San Francisco—Scrap dealers and consumers report there has been no "loosening" up in supply as a result of a National Production Authority regulation making it illegal to hoard steel, iron and nonferrous scrap. Iron and steel scrap has been moving to the mills as quickly as tonnage accumulates and little, if any, above normal inventory situations have been occuring in recent weeks. The mills report they have been drawing on scrap inventories to maintain their high operation.

Seattle—The scrap market is confused and erratic. Receipts are slow. Published quotations are nominal as each deal is negotiated. About 30,000 tons of steel scrap have arrived here from foreign areas in the last 60 days but mills are short with less than 90 days inventories.

Warehouse . . .

Warehouse Prices, Page 97

Philadelphia—Warehouses look for further decline in their bookings this month, as they doubt if M-6 relating to shipments from the mills will even sustain their incoming tonnage. One large distributor believes that shipments of major products from the mills for January and February will be off about 25 per cent from normal. To date distributors have had relatively little DO-rated tonnage.

Pittsburgh—Warehouse stocks of sheets and strip are so low some interests are limiting new bookings to DO orders, which they can extend to the mills as a basis for obtaining steel for stock replacement. Volume of this rated tonnage is still relatively light. Distributors' overall stock position continues to deteriorate as the mills are failing to meet previous delivery commitments. In addition to sheets and strip, suppliers of stainless products and cold-finished bars and plates have drastically reduced allotments for January and February delivery.

Cleveland—Inventory position of local warehouses is steadily deteriorating with consumer demand insistent and mill shipments not matching outgoing tonnage. Some distributors are in worse position than others since prior to the outbreak of the Korean war they had reduced their orders on the mills. Since warehouse allocations are based on the separate distributor's order volume on the mills in the first nine months of last year, those warehouses that had cut back their orders prior to June are receiving proportionately less tonnage than those that had continued to order their regular volume right through the first six months of the year.

Cincinnati—Pressure for steel from warehouses is increasing whereas the supply situation is worse. December volume was down because of depleted inventories. Replacements for stocks are lagging, and prospects for more liberal tonnage in first quarter, without control, are none too bright.

Chicago—Steel warehouses face the start of a new year with customer

demand at very high level and with inventories badly depleted and unbalanced. Since demand exceeds steel receipts, a strict system of rationing is being followed. Fear is that DO and support programs will shortly swell to proportions which will drastically shrink the tonnage of steel available for civilian use under NPA's directive M-6. This eventually will force many steel users to curtail their operations.

Los Angeles — Steel distributors' badly out-of-balance inventories have undergone steady depletion since July. One warehouseman says stocks stand at only 40 per cent of the level a year ago. Cuts of 60 to 70 per cent in first quarter allotment of non-rated steel to warehouses is causing manufacturers of appliances and consumer products to reduce operations.

San Francisco—Steel sheets are getting scarcer. Warehouses are beginning to insist on DO numbers from fabricators on scarce items. This, the supply houses feel, not only is more compatible to the preparedness program, but DO numbers also aid the warehouses in replenishing their stocks.

Seattle—Warehouses ended the year with low inventories. Seasonal letdown is less acute than usual. Coast mills are slow in delivering, eastern producers making a better record although it is difficult to place new business.

Canada . . .

Toronto, Ont.—Production of iron and steel in Canada in the first 10 months of 1950 attained an all time high record.

October pig iron production, 205,811 net tons, compares with 199,415 tons in September and 166,020 in October, 1949. Output included 149,571 tons of basic, 16,319 tons of foundry iron and 39,921 tons of malleable.

In the 10 months ended Oct. 31, iron output was 1,903,262 net tons, against 1,825,023 tons in the 1949 period and 1,779,905 tons in 1948.

Production of ferroalloys in October amounted to 16,959 net tons against 17,765 tons in September and 15,456 tons in October, 1949. First 10 months production of ferroalloys totaled 149,314 net tons against 184,992 tons in the like 1949 period.

Production of steel ingots and casting in October amounted to 293,928 net tons and compares with 274,947 tons in September and 258,891 tons in October, 1949.

For the first 10 months of 1950 production of steel ingots and castings totaled 2,803,401 net tons, comparing with 2,663,259 tons in the like 1949 period and 2,643,253 tons in 1948.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1065 tons, Lincoln Tunnel approaches, Jersey City, N. J., for Port of New York Authority, to Lehigh Structural Steel Co., Allentown, Pa.

1000 tons, Eielson Field, Alaska, power house, to Pacific Car & Foundry Co., Seattle; Peter Kiewit Sons Co., general contractor.

500 tons, boiler supports, Combustion Engineering Co., San Francisco, to Consolidated Western Steel Corp., Los Angeles.

400 tons, control tower, International Airport, New York, to Lehigh Structural Steel Co., Allentown, Pa.

300 tons, W. T. Grant store, New Haven, Conn., to Bethlehem Steel Co.

275 tons, school, Freeport, N. Y., to Dreier Structural Steel Co. Inc., Long Island City, N. Y.

225 tons, building 65, General Electric Co., Pittsfield, Mass., to Belmont Iron Works, Eddystone, Pa.

210 tons, W. T. Grant store, Jacksonville, Fla., to Aetna Steel Co., that city.

110 tons, state police barracks, Philadelphia, to Max Corchin & Sons, that city.

100 tons plus, Cowlitz power substation, to Isaacson Iron Works, Seattle, by Tacoma light department.

100 tons, molasses warehouse, Toledo, O., to Bethlehem Steel Co.

STRUCTURAL STEEL PENDING

16,400 tons, transmission towers, grillages, extensions, etc., for Bonneville Power Administration; Anthony M. Meyerstein, Brooklyn, N. Y., apparently low, $4,185,880; Bethlehem Pacific Coast Steel Corp., Seattle, second low $4,432,053.

9415 tons, Captree State Parkway bridge development for Jones Beach Parkway Authority, Suffolk county, New York; bids Jan. 26.

1400 tons, truss and girder span, Willamette river relocation project; L. H. Hoffman, Portland, Oreg., low $677,600, to U. S. Engineer, Portland.

1290 tons, state viaduct, route 25A, section 10, Newark, N. J.; bids Jan. 23.

1000 tons, addition, naval turbine testing laboratory, Trenton, N. J.; bids Jan. 25.

1000 tons, extension, Penn-Harris Hotel, Harrisburg, Pa.; bids Jan. 9.

700 tons, warehouse and office building, Raytheon Mfg. Co., Waltham, Mass.; bids in.

100 tons, Du Pont plant addition, Seaford, Del.; bids Jan. 11.

Unstated, service and rotor cranes, for Seattle light department; bids called Feb. 6.

REINFORCING BARS . . .

REINFORCING BARS PLACED

550 tons, laboratory and research building, Atomic Energy Commission, Newport, Ky., to Hugh J. Baker & Co., Indianapolis.

500 tons, auxiliary sewer, contract 3A, Chicago, to Ceco Steel Products Corp., Cicero, Ill.; M. J. Boyle & Co., Chicago, general contractor.

370 tons, Chippewa apartments, Chicago, to Joseph T. Ryerson & Son Inc., Chicago; Sumner S. Sollitt Construction Co., Chicago, general contractor.

218 tons, addition, Oak Park Hospital, Oak Park, Ill., to Ceco Steel Products Corp., Cicero, Ill.; J. W. Snyder Co., Chicago, general contractor.

REINFORCING BARS PENDING

5000 tons, second unit Seattle traffic viaduct; bids to Olympia, Wash., Jan. 9.

2200 tons, housing project, Louisville.

1450 tons, water filtration plant, Gary, Ind.; bids in.

890 tons, Wacker drive, Madison to Washington streets, Chicago.

800 tons, warehouse building, Minneapolis.

625 tons, steam-electric plant, Aurora, Minn.

500 tons, auxiliary sewer contract 3A, Chicago.

500 tons, high school, Louisville.

470 tons, Service Center Bldg., Rochester, Minn.

400 tons, blast furnace, Great Lakes Steel Corp., Detroit.

Again Available—
Limited Supply

STEEL EXPANSION FOR WAR

● Whether you produce steel, fabricate it or are an investor, the Korean war makes this book "must" reading.

Many consumers unable to obtain steel, feel that our steelmaking capacity should be increased considerably. The steel industry, on the other hand, recalls vividly that 62 per cent of its capacity was idle during the five years beginning with 1930 and that 41 per cent was not used in the 5-year period ending with 1939.

During World War II, some 15,000,000 tons of steel ingot capacity were added, most of which has been acquired by individual steel companies on an outright purchase or lease basis. Now the question has arisen as to whether our steelmaking capacity should be increased to an even greater extent. The experiences of World War II should be studied in coping with the various problems of the current emergency.

STEEL EXPANSION FOR WAR describes in detail the added capacity and cost of every steelmaking facility built during World War II. It contains a detailed list of companies making every type of finished steel product, plus data on new mills built during that period. Included is much information on new and revamped facilities of hundreds of plants, including those in ore, ore transportation, coal and coke, refractory, ferroalloy, scrap, foundry and forging industries.

STEEL EXPANSION FOR WAR is the authentic report on expansion of the steel industry for the 5½ years from January 1, 1940 to June 30, 1945. It was written by W. A. Hauck, chief of the Steel Control Branch of the War Production Board during World War II. You will find it invaluable in studying the future steel situation and in making your own plans in view of the Korean situation.

Illustrated with 148 photographs, numerous charts and tables, this helpful book is just $2.00 postpaid. Order your copy today before our limited supply is exhausted.

PENTON PUBLISHING COMPANY, Book Dept.,
Penton Building, Cleveland 13, Ohio
Please send me a copy of "Steel Expansion for War".
☐ Bill me (or my company) for $2.
☐ Remittance enclosed* in which case the book will be sent postpaid.
Signed ..... Title .....
Company .....
Address .....
City ..... Zone ..... State .....
*Please add 3% to cover state sales tax on orders for delivery in Ohio

376 tons, Dr. Norman Beatty Hospital, Westville, Ind.

245 tons, state viaduct, route 25A, section 10, Newark, N. J.; bids Jan. 23.

217 tons, terminal building, Hare airport, Chicago; Great Lakes Construction Co., Chicago, general contractor.

200 tons, children's hospital, Iowa City, Iowa.

Unstated, 360-foot box girder type span for Clark county, Washington; plans in preparation by Homer Hadley, Seattle; bids soon.

PLATES . . .

PLATES PLACED

1800 tons, four tanks, Royal Petroleum Co., Seymour, N. J., to Bethlehem Steel Co.

1600 tons, four tanks, Shell Oil Co., one in Saginaw, Mich., and three in Woodbridge, N. J., to Bethlehem Steel Co.

285 tons, one tank, Shell Oil Co., Charlotteville, N. C., to Chicago Bridge Co., Chicago.

200 tons, one tank, Shell Oil Co., New York, to Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

100 tons or more, five storage tanks, total capacity 35,000 barrels, for Atomic Energy Commission, Idaho Falls, Idaho, to Olsen Mfg. Co., Boise, Idaho, low $58,900.

Unstated tonnage, five steel car floats for the Erie, to Bethlehem Steel Co.; equipment comprises two 16-car floats and three 10-car floats.

PIPE . . .

CAST IRON PIPE PLACED

75 tons, 2000 feet 20 inch, for Ship Creek project, Anchorage, Alaska, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.; project involves 2000 tons, balance furnished by government.

CAST IRON PIPE PENDING

200 tons, King county District No. 20, Seattle; bids in Dec. 29.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Union Pacific, 10 gas turbine electric locomotives, to General Electric Co., Schenectady, N. Y. Represents first order placed for this newest form of rail motive power.

RAILROAD CARS PLACED

Lehigh & New England, 500 fifty-ton hopper cars, to American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Bangor & Aroostook, 500 refrigerator cars; pending.

FERROALLOYS

(*Continued from page* 97)

Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. add 5c for each 0.25% of N above 0.75%.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. 5 M x D, bulk, 23.25c per lb of contained Cr, c.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, Carload, packed, 8 MxD, 14.10c per lb of alloy; 1 ton 16.95c; less ton lot, 18.15c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34.41%, Si 42-49%, C 0.06% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.00c per pound of contained silicon; 1" x down, bulk 20.65c per pound of contained chromium plus 11.50c per pound of contained silicon, f.o.b. plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.0c per lb of contained silicon plus aluminum, 3" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract carload, 1" x D; packed, max 0.50% C grade, $1.08 per lb of contained chromium, ton lot $1.10, less ton $1.12. Delivered. Spot add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $3.25 per lb of contained W; 2000 lb W to 10,000 lb W, $3.35; less than 2000 lb W, $3.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $4.15 per lb of contained W; less than 1000 lb W, $4.25.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 19.00c per lb of contained Si; packed 20.40c; ton lot 21.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered, Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 15.55c per lb of contained Si, carload packed 16.8c, ton lot 17.8c, less ton 18.95c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.5c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 20.0c per lb of Si, c.l. packed 21.2c, ton lot 22.1c, less ton 23.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 98% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.65c per lb of alloy, ton lots packed 10.05c, 200 to 1999 lb 10.40c, smaller lots 10.90c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton lot 16.0c, less ton 16.9c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si) Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.55c, less ton 9.45c. Delivered. Spot, add 0.25c.
(Small size—weighing approx 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.9c, c.l. packed 7.7c, ton lot 8.5c, less ton 9.40c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 21.0c, ton lot 22.3c, less ton 23.3c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max. C 0.10% max.). Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $167 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $183 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $3.00 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3.10. **Primes and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.20.

Grainal: Vanadium Grainal No. 1, 93c per lb; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.20 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Zirconium Alloys

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l. lump, bulk 7.0c per lb of alloy, c.l. packed 7.75c, ton lot 8.5c, less ton 9.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Si 8% max., C 0.4% max.). Contract, ton lot, 2" x D, $4.90 p er lb of contained Cb, less ton $4.95. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min., C 0.30 max.) ton lots, 2" x D, $3.75 per lb of contained Cb plus Ta, delivered; less ton lots $3.80.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.0c per lb of alloy; ton lots 18.0c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal. Fe) Lump, carload, bulk 14.50c, packed 15.50c; ton lots, packed, 15.75c; less ton lots, packed, 16.25c per lb of alloy, delivered to destination within United States.

Ferrophosphorus: (23-25% based on 24%, P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth, $1.33; Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth $1.14, packed in bags containing 20 lb of molybdenum; Washington, Pa., 95.00c.

Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

California

Cleveland Cap Screw Co., Cleveland, appointed San Francisco office of Round California Chain Co. as its sales representative in northern California; the Los Angeles office, its representative in southern California, Arizona and New Mexico.

California

Operation of its new plant in the Los Angeles International Airport industrial tract, beginning Jan. 1, increases production capacity of **Tubing Appliance Co. Inc.** about tenfold. The firm makes open-end wrenches.

District of Columbia

General Electric Co., Schenectady, N. Y., opened a plant in Washington for the manufacture of germanium products, previously made at the company's Syracuse, N. Y., plant. Germanium products are miniature crystal.

Illinois

Unistrut Products Co., Chicago, plans construction of a building in Bellwood, Ill., to be headquarters, display room and warehouse for the company. First unit of the structure will cost about $400,000.

Delaware

Miracaloy Corp.—steel and metal hardening compounds—filed a charter of incorporation with the secretary of state's office, Dover, Del. Capital of the firm is listed at $500,000. U. S. Corporation Co., Dover, is serving as the principal office.

Delaware

Norris Corp.—machines—was chartered by the secretary of state's office, Dover, Del. Capital of the firm is listed at $300,000. Prentice-Hall Corporation System, Dover, is serving as the principal office.

Delaware

Leslie Welding Co. Inc.—welding—was chartered by the secretary of state's office, Dover, Del. Capital of the firm is listed at $150,000. U. S. Corporation Co., Dover, is serving as the principal office.

Delaware

Drill Bit & Tool Co.—drill bits, etc.—filed a charter of incorporation with the secretary of state's office, Dover, Del. Capital of the firm is listed at $5 million. Corporation Trust Co., Wilmington, Del., is serving as the principal office.

Maryland

Whitehead Metal Products Co. Inc., New York, moved its Baltimore metal warehouse to enlarged and improved quarters at 4300 E. Monument St., that city. John W. Marple is the resident branch manager.

Maryland

Bendix Radio Division of Bendix Aviation Corp., Towson, Md., which will shortly occupy additional space, has plans to about double its present facilities by next July. E. K. Foster is general manager.

Massachusetts

Ward Steel Co. opened a new warehouse and general office building at 87 Rindge Avenue Extension, Cambridge 40, Mass.

Michigan

Crobalt Inc., manufacturer of nonferrous cast-alloy cutting tools and wear-resistant alloys, moved into its new plant at 2800 S. State St., Ann Arbor, Mich. The building is the first of several units to be erected,

Michigan

Wellman Engineering Co., Cleveland, purchased the property and business of Anker-Holth Mfg. Co., Port Huron, Mich., producer of hydraulic and air-operated cylinders, chucks and collets, air valves and accessories. J. C. Hodge, executive vice president of Wellman, will supervise the operation of Anker-Holth Division of the company. W. L. Komph will continue as manager of sales and engineering and F. J. Theisen as plant manager.

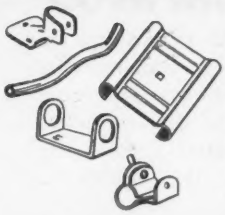
New York

Volland Electric Equipment Co. Inc., Buffalo, was named a dealer for Allis-Chalmers motors, controls and transformers in Erie and Niagara counties, New York.

New York

A $400,000 expansion program for **Electro Refractories & Alloys Corp.,** Buffalo, is planned. About $150,000 will be spent for additional manufacturing and research equipment at its plant in that city. About $250,000 will be spent for additional buildings and equipment at the com-

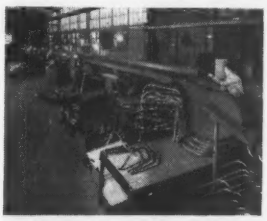
METAL *Fabricating*



BENDING . . SWAGING
FORMING . . CHROME PLATING
SHAPING . . DIE STAMPING

We offer you quality workmanship, prompt, efficient service for die stamping, chrome plating, swaging, tube shaping. Our fully equipped plant can handle any size . . . any quantity. Consult us NOW for free estimates.

WE CAN PRODUCE FROM 1 to 1,000,000 PIECES



Illustrated

Our chrome tubing is skillfully polished to give added beauty and brilliance to the finished product. All along the line . . . no effort is spared to meet your particular requirements, and assure you of quality, dependability, service. Let us give you our estimate on that next order.

AN ENTIRE OPERATION UNDER ONE ROOF

ASK ABOUT OUR COMPLETE FACILITIES

NIAGARA PLATERS, INC.

555 MAIN STREET, NORTH TONAWANDA, NEW YORK

THEORY AND PRACTICE OF ROLLING STEEL By Wilhelm Tafel

312 Pages
Price Postpaid $4.50

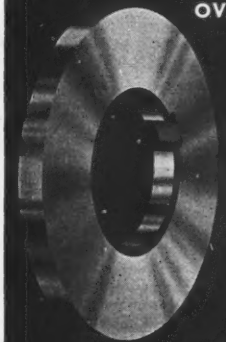
Covers every angle of the design, construction and operation of the steel rolling mill.

THE PENTON PUBLISHING CO.
Book Department, 1213 W. 3rd St., Cleveland 13, O.

COWLES

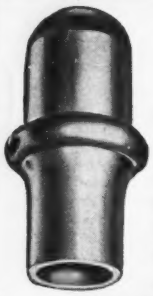
GANG SLITTING KNIVES

OVER 30 YEARS EXPERIENCE



Standard for *Service* and *Durability.* Ground to extremely close Tolerances and Finish. Made by *Toolmakers.*

COWLES TOOL COMPANY
2086 W. 110th ST. CLEVELAND 2, OHIO



YOUR SOURCE FOR
STAMPINGS

Need metal parts? Let our plant augment your manufacturing facilities. Our workmanship and delivery schedules will satisfy you. Send blueprints or samples for quotation.

WORCESTER STAMPED METAL CO.
Established 1883
10 HUNT STREET • WORCESTER, MASS.

mechanical
POWER PRESSES
FOR
ALL INDUSTRIES
ZEH & HAHNEMANN CO.
56 AVENUE A, NEWARK 5, N. J.

OHIO LOCOMOTIVE CRANES
25 TO 40 TON CAPACITY
GASOLINE • DIESEL
ELECTRIC • STEAM

THE OHIO LOCOMOTIVE CRANE CO.
BUCYRUS, OHIO

THE BELMONT IRON WORKS
STRUCTURAL STEEL—BUILDINGS & BRIDGES
RIVETED—ARC WELDED *Cable Address—Beliron*
Engineers—Fabricators—Erectors—Contractors—Exporters
Shops—Philadelphia—Eddystone—Royersford
Main Office: Phila. 46, Pa.
New York Office—44 Whitehall St., N. Y. 4, N. Y.

★ . . . for any information about bearings and bearing metals, consult with the A. W. Cadman Mfg. Co., master makers of fine bearing metals since 1860.

PITTSBURGH ..... *28th and Smallman Streets*
PHILADELPHIA ..... *18 W. Chelten St.* .....
CHICAGO ..... *Manhattan Bldg.* .....
NEW YORK ..... *150 Nassau St.* .....

BLAST FURNACE COPPER CASTINGS
Bosh Plates Mantle Plates Cinder Notches
Tuyeres Tuyere Coolers
Host Blast Valves and Valve Seats
SMEETH-HARWOOD COMPANY
2401-09 West Cermak Road, Chicago 8, Illinois
Superior Blast Furnace Copper Castings Exclusively

• PICKLING TANKS •
• PLATING TANKS •
• ANODIZE TANKS •
HEATING UNITS FOR ACID TANKS
HEIL PROCESS EQUIPMENT CO.
12393 ELMWOOD AVE. CLEVELAND, OHIO

DIFFERENTIAL
STEEL CAR CO., FINDLAY, OHIO

Air Dump Cars, Mine Cars, Locomotives, Lorries
AXLESS Trains and
Complete Haulage Systems

TOLEDO STAMPINGS
Let us make your stamping problems our problems. Our Engineering Department has had many years of experience in development work and our production facilities include not only a modern press department, but facilities for copper hydrogen brazing and other types of welding and assembling work. We solicit your prints and inquiries.

Toledo Stamping and Manufacturing Co.
90 Fearing Blvd., Toledo, Ohio
Detroit Office: 12800 Puritan Ave., Detroit 27, Mich.
Chicago Office: 333 North Michigan Ave., Chicago, Ill.

INTRODUCTION TO THE STUDY OF HEAT TREATMENT OF METALLURGICAL PRODUCTS
By Albert Portevin

Fundamental knowledge and essential principles of heat treatment of steel are presented in simple and understandable manner. Research engineers, metallurgical students and steel plant metallurgists engaged in metallurgical investigations and the heat treatment of ferrous and non-ferrous metals will find this book of inestimable value.

246 pages 4 tables
69 illustrations Price $5.00 Postpaid

THE PENTON PUBLISHING CO.
Book Department, 1213 W. 3rd St., Cleveland 13, O.

pany's silicon carbon-grit plant in Cap de la Madeleine, Que., Canada.

New York

Lupomatic Industries Inc., New York, producer of tumbling machines, buffing and polishing compounds, etc., changed its name to Tumb-L-Matic Inc.

Ohio

Trabon Engineering Corp., Cleveland, appointed Ritter Engineering Co., Pittsburgh, as exclusive distributor in that district for its centralized lubrication system.

Ohio

Reliance Electric & Engineering Co., Cleveland, established new branch sales offices in Newark, N. J., and El Dorado, Ark., and transferred from Syracuse to Buffalo the district office directing the company's sales throughout northern and western New York state. C. B. Allen is district manager in Buffalo, heading up the work formerly handled from Syracuse by G. E. Bevis, now a vice president of the recently acquired Canadian division of Reliance at Welland, Ont. William H. Brehmer is the branch manager in Syracuse. Elwood H. Koontz is branch manager in Newark, assisted by F. R. Obenchain, sales engineer. R. C. Suttle is manager of the El Dorado office.

Oklahoma

Miami Armature Works, Miami, Okla., was named a certified service shop for Allis-Chalmers motors and controls in six northeastern Oklahoma and two southeastern Kansas counties.

Pennsylvania

Pittsburgh Plate Glass Co., Pittsburgh, has expended more than $80 million since the close of World War II on replacement of equipment, alterations to existing facilities and the construction of new factories and merchandising outlets.

Tennessee

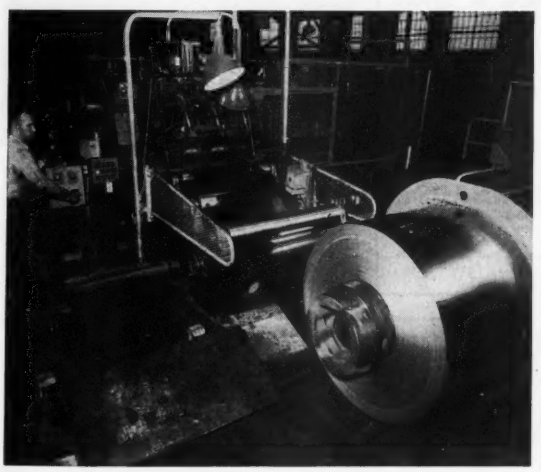
Tennessee Eastman Corp., Kingsport, Tenn., producer of cellulose products and chemicals and a wholly-owned subsidiary of Eastman Kodak Co., Rochester, N. Y., was dissolved as a separate corporation and is now a division of the parent company.

Texas

Halliburton Oil Well Cementing Co., Duncan, Okla., has plans in progress for an addition to its plant in Houston. Estimated cost is $130,000. Charles S. Chase, Houston, is the architect.

Virginia

Construction of an office, warehouse and manufacturing and repair plant in Richmond, Va., for **Westinghouse Electric Corp.,** Pittsburgh, will begin soon. All Westinghouse activities, except those of Westinghouse Electric Supply Co., in that city will be consolidated in the building, scheduled to be completed early in 1952.



SLICK FOR STRIP: The entry end of a modern, high-speed, side-trimming line where steel strip is trimmed before tin plating. A Westinghouse photoelectric edge regulator, which can be seen at the right of the strip between the first two idler rolls, provides the intelligence that shifts the entire pay-off reel assembly so the edge of the strip is maintained at the same relative entry position

Quantity PRODUCTION of GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION
MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

The Cleveland Steel Tool Co.
• PUNCHES • DIES • CHISELS • RIVET SETS •
IF IT'S *RIVETED* YOU *KNOW* IT'S SAFE
WE FEATURE SPECIAL PUNCHES & DIES
660 E. 82nd ST., CLEVELAND, O.

Warehouse Specialists in STEEL TUBING exclusively!
Seamless and Welded
Stainless, Alloy and Carbon Steels
For Mechanical and Pressure Use
TUBE DISTRIBUTORS CO., INC.
146 GREEN ST., BROOKLYN 22, N. Y., EVergreen 9-6000

WHEELING STEEL CORPORATION
WHEELING, WEST VIRGINIA
COP-R-LOY PIPE-SHEETS
Ductilite
THE MODERN TIN PLATE
LA BELLE CUT NAILS
WHEELING STEEL

EQUIPMENT--MATERIALS

RAILROAD EQUIPMENT—*FOR SALE*

STANDARD GAUGE FREIGHT CARS

Box, Single Sheathed, 40 & 50-Ton
Flats, 50-Ton and 70-Ton
Gondolas, Composite, 50-Ton and 70-Ton
Hoppers, Covered, All-Steel, 50-Ton & 70-Ton
Hoppers, Twin, All-Steel, 50-Ton, Cross Dump
Hoppers, Twin, All-Steel, 50-Ton, Side Dump
Hoppers, Triple, All-Steel, 70-Ton, Cross Dump
Ore Hopper, All-Steel, 50-Ton, Center Dump
Tank, 8,000-Gallon, Class II
Tank, 10,000-Gallon, Class III

STANDARD GAUGE DUMP CARS

End Dump, 20-Yd., 50-Ton, Drop Door
End Dump, 10-Yd., 30-Ton, Lift Door
Side Dump, 16-Yd., 40-Ton, Lift Door
Side Dump, 20-Yd., 40-Ton, Lift Door
Side Dump, 30-Yd., 50-Ton, Lift Door

STANDARD GAUGE LOCOMOTIVES

33-Ton Gasoline
Gasoline—10-Ton to 25-Ton
Diesel-Mechanical—8-Ton to 30-Ton
Gasoline-Electric—35-Ton
Propane-Electric—70-Ton

General Electric Diesel-Electric
44-Ton, 380 H.P., 4 Traction Motors
45-Ton, 300 H.P., 2 Traction Motors
65-Ton, 4 Traction Motors

Send us your inquiries — *We Buy Freight Cars for Dismantling* — *Send us your offerings*

REPAIR PARTS For All Types of Freight Cars

IRON & STEEL PRODUCTS, INC.

General Office
13462 S. Brainard Ave.
Chicago 33, Illinois
Phone: BAyport 1-3456

New York Office
50-D Church Street
New York 7, N. Y.
Phone: BEekman 3-8230

STORAGE TANKS
6,000 Gallon
8,000 Gallon
10,000 Gallon

"ANYTHING containing IRON or STEEL"

FOR SALE
PRECISION STEEL TUBING

Prime Material in Original mill boxes.
250,000 ft.— .138" O. D. x .022 Wall
NE 8630 in 14 ft. random mill lengths.
441,000 ft.— .274" O. D. x .006 Wall
SAE 1015. Random 10 ft. mill lengths.
26,340 ft.— .298" O. D. x .008 Wall
SAE 1015. Random 10 ft. mill lengths.

—REDUCED BELOW COST—

Dept. B2

DEPENDABLE SALES CORP.
315 Gold Street, Brooklyn 1, N. Y.
Tel.—MAin 4-8437-8-9

STEEL WANTED SHEETS

Sheet Metal Board of Trade

CHARLES M. WILLIAMSON
111 W. Washington St. Chicago 2
CEntral 6-9854

MATHEWS CONVEYERS

Since 1905. Engineers and manufacturers of Conveyers and Conveyer Systems for the Metal-working Industries.

Three modern plants. Engineering Offices in All Principal Cities. There's an Engineering Sales Office near you.

MATHEWS CONVEYER CO.
ELLWOOD CITY · PENNSYLVANIA
SAN CARLOS · · CALIFORNIA
PORT HOPE · ONTARIO, CANADA

Immediate Delivery
RELAYING RAIL
30-35-40-45-56 & 60
70-72-80-85-100-131 lb.
Angle Bars Available
• • •
Locomotives—
Locomotive Cranes
Passenger and Freight Cars
DULIEN STEEL PRODUCTS, INC.
9265 E. Marginal Way
Seattle 8, Washington

WANTED
BELL TYPE FURNACE

Suitable for controlled atmosphere annealing of steel rod coils. Temperature range to 1550° F. Minimum diameter of load 48". With or without atmosphere generator and temperature controls. Write Box 199, STEEL, Penton Bldg., Cleveland 13, O.

WANTED

Two (2) Good Used 65" O.D. LIFTING MAGNETS for 230 Volt, D.C. Current.

Write full details and prices too, to Box 212, STEEL, Penton Bldg., Cleveland 13, O.

WANTED—LATE TYPE
#0-#00 BROWN & SHARPE SCREW MACHINES

Also Steel Sheets, Strip, Coil, Bar, Wire, etc.
Write Box 179
STEEL, Penton Bldg., Cleveland 13, O.

1—#4½ BLISS PRESS V-Belt Drive Dbl. Rl. Feed Ser. Ctr. Straight Side 1942.
1—#304 BLISS PRESS V-Belt Dr. Str. Side 1942.
1—#74½ BLISS PRESS 90 Ton O.B. "C" Frame W/M
1—25 Ton H&W Dieing Press 1½" Str. Dbl. Rd. Fd. Ser. Cutter.
1—HENDEY 20" Crank SHAPER Rap. Trav. M. D.
2—Wthy. Farrel Coin. Presses 125 Ton Cap.

—Wanted—

STEEL SHEETS, STRIP, BAR, WIRE, MACHINERY
SEABOARD STEEL CO., INC. New Haven, Conn.

FOR SALE STEEL TUBING—NEW
★ 150 TON ★
2½" OD x 3/16 x 48"—Seamless
2¾" OD x .104 x 48"—Seamless
2½" OD x .109 x 35"—El. Welded
@ $140.00 per Ton ★
Write Box 215,
STEEL, Penton Bldg., Cleveland 13, O.

MAKE IT A HABIT . . .

To read the classified pages of STEEL each week. You will find listed there surplus materials and used equipment for sale which may fill your requirements to a tee and save you much time and effort locating them.